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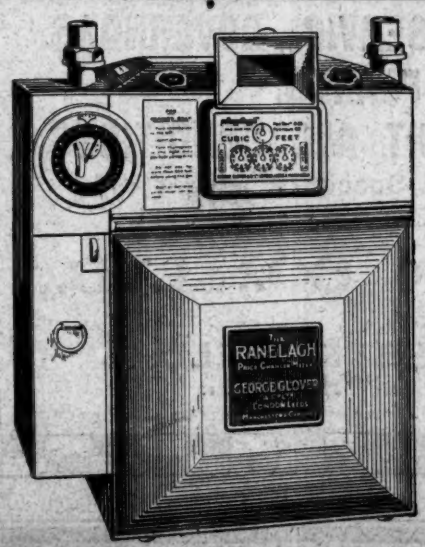

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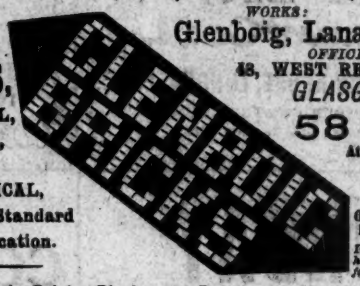

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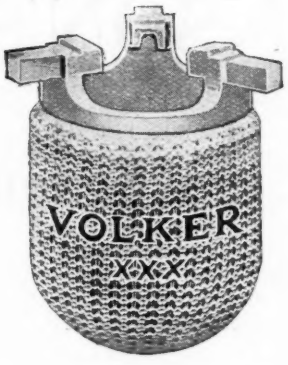

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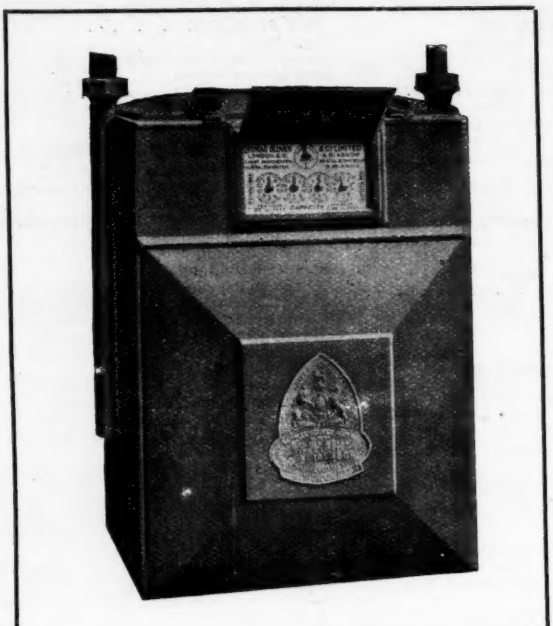

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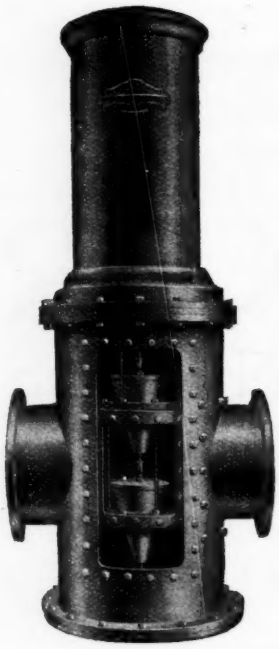

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VOL. CLIX., No. 3094.] WEDNESDAY, AUGUST 30, 1922 [74TH YEAR.

EDITORIAL NOTES.

Applications for Therm Orders—Municipal Authorities and the Act.

THE date has passed at and from which the Board of Trade may, after giving three months' notice, issue an Order applying the therm system of charging to any undertaking that has not voluntarily applied for one. Royal Assent was given to the Gas Regulation Act on Aug. 4, 1920; so that the two years have expired which it was ordained should lapse before the enforcing power of the Board of Trade became operative. This is under sub-section 5 of clause 1 of the Act; and it will be seen that the power to the Board is permissive, and not obligatory. The power may be exercised at any time; but there are manifestly some municipal authorities who are hoping that no change will be made in their case. But one purpose of the Act is to get gas supply as far as possible on one basis, on which conditions will be more comparable than they have hitherto been. It is not likely, however, that the authority conferred upon the Board in the matter of compulsory Orders will be exercised for some time to come. The two years have proved to be an underestimate for the amount of work the Board had placed upon them. Every case has had to receive individual attention before decision was given; and the work could not be done perfunctorily, as the Board have to consider all interests within the decrees of the Act, and to be in a position to justify their prescriptions as to standard and maximum prices, should occasion require. The records of the National Gas Council show that up to July 31 there were still outstanding 88 applications for Orders under section 1, and others have been made during the present month. At the date mentioned, the sum of the applications was 378; and the total of Orders issued was 290. The Board are therefore not likely to move under sub-section 5 of clause 1 until they have fairly well cleaned from the slate the voluntary applications. But, of course, they may take action in special circumstances.

In this connection, it will be remembered that, at the last general meeting of the National Gas Council, Alderman F. S. Phillips, of Salford, stated that he had been asked to convene a meeting of the municipal authorities possessing gas undertakings for the purpose of considering their position under, and attitude towards, the Act. That meeting has been held. There was considerable discussion; but not much has been allowed to transpire as to what actually took place. The conference enabled a general collection of views to be made from the different angles from which the Act is regarded by the various municipal authorities owning gas undertakings. One point upon which information was given is that, in the case of municipal undertakings who have no statutory maximum price, it is not the intention of the Board of Trade to impose statutory restriction as to price. The municipal authorities appear to have made up their minds to continue to mark time, and to wait upon events. In fact, the information is given that at the meeting it was agreed not to apply for an Order under section 1 for the time being, except in special circumstances. A small committee were also appointed to watch developments, and to make recommendations to local authorities thereon. Anyway, if any notice is given by the Board of Trade of their intention to make a compulsory Order, local authorities are asked to send information to the National Gas Council. Of course, one cannot say positively what will happen in this respect; but the position does not suggest that the Board will be at all anxious for the time being to exercise their authority in this particular until they see daylight through the work already in hand, the volume of which is fairly well maintained by new voluntary applications—in the main from companies.

Enriching by Low-Temperature Gas.

IT may be remembered that on May 31 last, comment was made in the "JOURNAL" upon a suggestion by Sir George Beilby, arising from the investigations at the Fuel Research Station, that the rich gas from low-temperature carbonization of coal should be utilized instead of oil for the enrichment of low calorific power gas for town purposes. Sir George reckoned that, at the then current prices of low temperature products, the enriching gas (1000 B.Th.U. per cubic foot) could be produced at 4d. per therm, and only 5 p.ct. of the gas would be required to raise 450 B.Th.U. gas to 477·5 B.Th.U. Subsequently, some information was obtained from Mr. Walter Chaney, who has been studying this question, upon which a further editorial article was written (see "JOURNAL" for June 14); and in an article published in later columns to-day, Mr. Chaney has developed upon what was then said. In contemplating this subject, the gas engineer has to try to dismiss entirely from his mind that it is cubic feet he is after in these times, and think only of therms. When this has been done, the outlook on carbonizing temperatures alters considerably; and the question to be considered is whether or not there is anything to be gained in the result by carbonizing at both high and low temperatures, or to make a larger quantity of blue water gas (or gas from complete gasification plant), with low-temperature gas as the enricher. The new suggestion enlarges materially the area of our consideration of carbonization practices. Mr. Chaney holds that there is a financial gain, and an important one, in bringing for the purpose of enrichment low-temperature gas into the field of practical application among the carbonizing processes of the industry; and in this, of course, he has the support of the Director of Fuel Research, an authority on such matters. In the gas industry, however, there is a proneness to regard calculated data as not being so convincing as those drawn from actual working experience, and there has been quite good reason for this attitude in past experience. At the same time, in such matters as this a start is usually made in theory and calculation; but what would now be an advantage would be to have a low-temperature plant actually in operation at a gas-works in combination with the other plant, in order to ascertain exactly the over-all results to be derived by combination. It is true that the gas industry has had a large experience of the thermal results of mixing a high calorific coal gas with a low calorific value water gas. The new proposition, however, carries us a step farther; and so we should like to see the actual working results of a combination such as is proposed. If successful, coal would then be the industry's sole raw material; and no longer would there be need for relying upon imported oil, the price of which has shown such capricious movements in the past.

In the opening passages of his present article, Mr. Chaney points out that the registration of gas is still based upon the volume passed through the consumers' meters; and it is therefore obvious that the yield in therms is financially more advantageous the higher the declared calorific value—that is to say, "financially" more advantageous in the

matter of revenue per 1000 c.ft. Naturally this is so; but it is a generalization that requires qualification, from points of view both of net cost of production, and suitability of gas in utilization. But that part of Mr. Chaney's article requires to be read in conjunction with all that follows, for the whole argument is in favour of mixing a very rich calorific value gas with a gas of a calorific value anything between 30 and 45 p.ct. that of the enriching gas. Mr. Chaney illustrates his points; and he utilizes the figures given by Mr. F. J. Bradfield in his analysis of the accounts of the Metropolitan gas companies, as published in our issue for Feb. 22. The figures are worth studying, as they are actual ones from last year's working.

Accepting the previously mentioned estimate of the Fuel Research Board of 4d. per therm for low-temperature gas, and taking blue water gas as costing to-day 4d. per therm, then a 480 B.Th.U. gas—composed of 25·7 p.ct. of low-temperature gas of 1000 B.Th.U., and 74·3 p.ct. of blue water gas of 300 B.Th.U.—would only cost 4d. per therm in the holder. Taking the Brentford Company, with last year a net cost of 10·03d. per therm, Mr. Chaney estimates that a mixture of 42·9 p.ct. of 511 B.Th.U. coal gas, 47·2 p.ct. of 300 B.Th.U. blue water gas, and 9·9 p.ct. of low-temperature gas, would give the Company a gas of 460 B.Th.U. for 6·58d. in the holder, showing a saving of 3·45d. But the very first therm figure in the tabulated statement is that of the South Metropolitan Company; and it is only 6·31d. per therm with straight coal gas. But this does not nonplus Mr. Chaney. He proceeds to show how, in his opinion, the South Metropolitan Company could improve on their figure. He reminds the reader that Sir George Beilby, in his paper before the Institution of Gas Engineers last year, stated that he could obtain, by steaming in vertical retorts, a yield of 110·8 therms per ton of coal; the calorific value of the gas being 432 B.Th.U. A mixture of 8·5 p.ct. of low-temperature 1000 B.Th.U. gas and 91·5 p.ct. of 432 B.Th.U. gas, would give 480 B.Th.U.; and the cost per therm would be about 4d. In other words, the suggestion is that the Brentford Company could save 3·45d. per therm by adopting Mr. Chaney's suggestion, and the South Metropolitan Company, by scrapping its horizontal retorts, steaming heavily in vertical retorts, and using low-temperature gas for enrichment, could save about 2·31d. per therm. That is as we construe the contentions.

All the companies mentioned in the tabulated statement in the article will examine very carefully their own figures in the light of what Mr. Chaney has to say. In it, he places his cards fully exposed on the table, and so in effect asks other gas engineers to show him where, if they can, his submission is wrong—that low-temperature gas used as an enricher enables the holder cost per therm to be reduced. There is no doubt he would be glad to discuss any criticisms. He also maintains that the process of enrichment by low-temperature gas will result in a considerable saving of coal. There is one point that is not referred to in the article. It is that, assuming in actual working the case as presented would be confirmed, there would be no necessity, in the quest for cheap therms, to supply the low calorific value gas that has frequently been mentioned as essential to attain a low cost.

There is the further consideration that it is necessary to render the production of home-made oils from coal almost as secure as the manufacture of other munitions of war. But the main point for the gas industry is, Will low-temperature gas used, instead of oil, as an enricher of gas produced by other systems, give us therms at a lower cost? Mr. Chaney replies in the affirmative. What have other engineers to say to this?

The Handicap of CO Limitation.

The gas industry in this country has cause to be thankful that the Departmental Committees who were appointed by the Board of Trade to consider the question of whether or not any restrictions were desirable upon incombustibles and carbon monoxide in gas, and if so to what extent, were able to report in the negative—particularly in the present transition stage of the industry. In no country other than in France has there been any specific limitation of the proportions of mixed gases for the purpose of placing a bound to carbon monoxide content. In 1921 we referred to the legislation that was then before the French Chamber, which, among other features, curtailed to 20 p.ct. the proportion of water gas that could be sent-out in a town gas supply. We do not understand that there was even any discrimination made between blue and carburetted water gas in respect of percentage. The professional men of the gas industry of France are well aware that in this matter they stand in an isolated position in the world, and that the ordinance is a serious hindrance to progress in the adoption of new gas-making processes. They therefore look to the day when they will have complete freedom.

The point was raised by M. Gregory, in one of the papers read before the Société Technique du Gaz at the recent annual meeting, on "The Rincker Processes of Complete "Gasification and Carburation." In considering new processes, the author says, it is necessary to take into account the extent to which the gas can be manufactured to be of service to the industry in France, pending the arrival of an era of greater freedom. It is not only a question as to the extent to which a particular process can be used, and gas be manufactured, to be of service to the industry, but it is a matter affecting the whole country, from the point of view of fuel economy and efficiency. Now in respect of the Rincker process and complete gasification, the paper shows that it has an efficiency of some 74 p.ct., which is quite good with the particular coal used; and it would be improved if the waste blow gases were utilized for raising steam for the plant, for which purpose, it is incidentally mentioned, the inventor has devised, with a collaborator, a very ingenious arrangement. The gas is of 362 B.Th.U. gross; and an analysis shows 37·5 p.ct. of carbon monoxide, and under 10 p.ct. of inerts. Later on, 34 p.ct. of carbon monoxide is alluded to. The gas, even if enriched, could not be distributed in France without admixture with other gas owing to the percentage content of carbon monoxide; and thus, in those places where financial and coal economies could be shown by complete gasification, France is absolutely deprived of the advantage. This means that completely stemmed is advance to the full adoption of new gas-making processes; and so M. Gregory, like his professional colleagues, has to consider the position in relation to the extent to which such plant can be applied. It is a case of Hobson's choice. The gas cannot be used "neat," but only as a diluent of coal gas, either to improve thermal efficiency or to give output elasticity; and both these points have to be considered by gas men in these times when economy is more important than ever, and when gas demands are as mutable as the weather.

M. Gregory therefore considers the respective advantages of blue water-gas plant and complete gasification in a plant such as the Rincker, in which twin generators are employed, which serve alternately for the carbonization of the coal and the gasification of the coke. If the thermal efficiencies of the two processes, and not only gas volumes, are taken into account (we would suggest that composition is also a factor), the balance from the point of view of raw materials is in favour of complete gasification, even for dilution purposes. That is the finding of the author of the paper. On the other hand, a complete gasification plant costs more per unit of production than a simple water-gas plant. This notwithstanding, his leaning is towards complete gasification, and especially in France with its carbon monoxide limitation. Owing to this limitation, complete gasification plant gives a larger range in the supply of a diluent. Taking the Rincker gas as containing 34 p.ct. of carbon monoxide, it would be possible to use 37 p.ct. of the gas, as compared with about 27 p.ct. of blue water gas, and yet keep within the permissible French limit. The carbon monoxide content would in both cases be probably between 17 and 18 p.ct.; but French gas engineers would have the ability to use 10 p.ct. more of the Rincker gas, which is not in the circumstances a negligible quantity. But one cannot speak dogmatically in this regard—not even under French conditions. Cost must come into consideration; and what at one time may be preferable procedure, may not be so at another time. At one time, gas from complete gasification plant may be the most economical; at another time, blue water gas; and at another, carburetted water gas. By the way, it is noticed that mention is made of a new carburation process in connection with the Rincker plant. We have not the complete details, and so cannot judge as to how far it is "new." But the idea of carburation by the introduction of oil to a column of incandescent coke is not particularly new. In this system water gas is formed in one of the generators while carburation takes place during the passage of the gas through the incandescent coke in the second generator. Oil or tar can be employed as the carburant. Such a system of

enrichment appears crude; and we cannot think that the efficiency, using oil, can be high. Carburetting as performed in an ordinary C.W.G. plant can show a very high efficiency—varying, of course, with the quantity of oil used. But we cannot imagine that the essential conditions to high efficiency are to be realized by the mere utilization of a column of incandescent coke. However, it is said that the Rincker gas which (as already seen) has a calorific value of a little over 360 B.Th.U. is raised by the carburation system to 500 B.Th.U.

However, this is outside the main question that we have been considering in this article, which is the effect of limitation in one particular in preventing the full adoption of new gas-producing invention. French gas engineers feel that they are handicapped in this respect; and we are sure that the handicap is neither good for France nor for the gas industry and its customers in that country.

Oil Gas Catalytically Produced.

In a previous article, it is suggested that, for the purpose of the enrichment of coal gas of low calorific power or blue water gas, the rich gas derived from low-temperature carbonization may in time be utilized, instead of oil. It has also been seen in another article that in France gas engineers are limited in their operations through carbon monoxide restrictions, which confine them in respect of the proportion of water gas that may be used. This fact, combined with the calorific power of the gas that has to be supplied, enforces to an extent the carburetting of the diluent water gas; and therefore attention has been given to the question of the best way to gasify the oil. The ordinary methods of cracking gas oil are regarded as unscientific and uneconomical by M. Mallet in a paper read before the Société Technique du Gaz. At any rate, that is as we construe his statement, that it has been questionable for some time whether the crude method of cracking in general use could not be replaced by some process more scientific and economical. Whether a process is crude or otherwise may be judged by its efficiency; and given proper proportions of plant to work to be done, with due regard to temperatures and other details, a high efficiency can be obtained by the oil-gas process of a C.W.G. plant. This being the case, one would be very chary about making a departure from it to any process that has the appearance of being more scientific, but which might add complication, and involve one in a reduced economy. This is what crosses the mind on reading M. Mallet's paper, which calls attention to the process of catalytically treating petroleum oils for the purpose of gas production, and leaves us completely in the dark as to costs, but with the impression that the process would, from its very nature, prove expensive, and require a good deal of supervision, without any attractive compensating advantages.

The catalytic method of gasifying oil is the invention of M. Sabatier and Prof. Mailhe, and has been practically applied to gas manufacture by M. Léon Blanchet. They employ copper in the pulverulent state, amalgamated with magnesium to make it more permeable. The inventors find that this enables them at moderate temperatures to obtain a large quantity of rich gas without dissociation of the material treated. By covering the interior of their retort with copper, they only have a light deposit of soft non-adhesive carbon. From a ton of oil of 19,650 B.Th.U. per lb., working at a maximum temperature of 600° C., 15,070 c.ft. of gas were obtained of a calorific value of 1686 B.Th.U. per cubic foot, with, in addition, 62 gallons of motor spirit, and 410 lbs. of tar. This means that of the 44,016,000 B.Th.U. in the ton of oil, 25,408,020 B.Th.U. were surrendered in the form of oil gas—in other words, 57·7 p.ct. of the potential heat of the original oil was given in the form of gas by the catalytic treatment. In the tar a certain quantity of undecomposed gas oil is found, which shows that complete effectiveness of the process could only be achieved by increasing the catalytic power, which, of course, would mean enhanced cost. If, however, the efficiency of the process is to be raised, this would have to be done, or the gas oil must be recovered from the tar by distillation. This appendix to catalytic treatment means complication of the process, and obviously must add to its cost. It is stated that the process has been experimentally tried in England, and at the Forest Gas-Works in Brussels. Consideration of the information at present at disposal induces us to agree with M. Mallet that the commercial importance of the process will only be established by working it over a long period on a fairly considerable scale. Until then there must be a suspension of judgment.

Coal Points.

For purchasing for home use, the coal position temporarily does not appear to be so good as it was a few months ago; and so those who entered into contracts earlier in the year have secured an advantage from what they then did. The strikes in America and Canada, and the buying of British coal by Germany and other continental countries, have considerably influenced the position; but, of course, this condition will not long continue. The settlement of the differences between the miners and owners of the United States and Canada will quickly put a different complexion on the position. Pretty certain it is that the peak of the export load which this country can carry has almost been reached in these times, in view of the limitations imposed by the coal-handling equipment, though at the same time the July export figures—5,063,763 tons—multiplied by twelve would not bring the total quantity of coal exported up to the figure of the year preceding the war. Buyers know that during this rush for coal for shipment abroad, despite the slackness of home industrial demand, there has been a stiffening of the quotations for home requirements, though, when contract business is being negotiated, it is found that there is an amount of flexibility about quotations, in view of the desire of collieries to secure long-term contracts with customers whose demands and needs are certain and fairly regular. This is, or should be, a bargaining advantage on the side of gas undertakings.

It is also known that much of the export business has been done at figures that will compare somewhat favourably with home prices. This is a matter of policy. The war and the coal strike disastrously affected the export business; and the colliery owners naturally want to re-establish their foreign trade as firmly as possible while there is the chance. At the same time, it should not be done to the disadvantage of this country; and particularly when the prices are remembered that British industry had to pay for inferior coal from abroad during the weeks of its exigent need last year. The 5,063,763 tons of coal shipped last month from this country had a value of £5,579,538, which is only a fraction of a penny over £1 2s. per ton. Of this quantity, 725,897 tons were gas coal, with a value attached of £771,107, or a fraction of a penny over £1 1s. per ton. August may show some variation from these figures, in view of the heavy shipments to America. Of course the per ton values are only average ones, and so do not disclose the prices above or below that have been paid for various grades of coal.

Reverting to the question of contracts for gas coal, an interesting point is that in certain cases a new condition has been agreed; and it is a pity it does not apply to all gas coal contracts. The condition limits the percentage of ash in the coal to be delivered. There are other instances where gas undertakings have obtained the inclusion of a protective clause in which a maximum percentage of ash has been agreed; and the price of coal is to be reduced *pro ratâ* if the maximum is exceeded. Any excess of ash in coal is an uneconomy throughout the carbonizing process. It wastes space, fuel, and labour, and seriously depreciates the value of coke.

Meters Indicating Therms.

There is present activity in the endeavour to devise meters that will show consumers their therm consumption. One correspondent recently called attention, in a letter to the "Journal" [p. 327], to such a meter. Now we see that Dr. Carpenter, in an interview that a representative of the "Evening Standard" had with him anent the Press attack on the therm (which has been aided and abetted by people who ought to know better), incidentally mentioned that it is the necessity of having to convert cubic feet into thermal units which has caused much of the outcry against the therm. "To overcome this difficulty," the report of the interview continued, "we are introducing a new coin meter that will show on the scale what the consumer pays for in using gas by the therm. This meter will indicate the therms consumed just as the old meters showed the consumption in cubic feet." On the general question, Dr. Carpenter said the very last thing that would

happen is the abolition of the therm system. It was devised in the interests of the consumers, and for that reason, and no other, will not be displaced.

Gas Coal Markets.

Canada is making large inquiry for coal, and America is still buying, and likely to do so for some time longer, in view of the prolonged dispute with the miners, and the exhaustion of stocks. The outlook across the Atlantic suggests that it will be some time before leeway can be made up from home supplies. The policy is to look forward, and to rebuild stocks from any source. Regarding gas coal, the position in our home markets is practically unchanged from what it was a week ago—particularly in Durham and Northumberland, where the bookings are keeping the collieries very busy. In other markets there is much activity in the supply of coal for gas-works under contract, and prospects are regarded as excellent. Gas-works are now busy putting coal into stock for the winter. In the Midland areas, a fair amount of spot buying is proceeding.

Sulphuric Acid.

Prices for sulphuric acid are gradually reaching a more appropriate level, though even now the costs of sulphate of ammonia making are such that several of the less influential concerns have had to discontinue production. For the Lancashire and North Wales area, fresh prices for acid were agreed which came into operation on July 1. The price of arsenical acid 140° is £3 5s. per ton, *plus* or *minus* 4d. per degree. Spent oxide acid 140° for sulphate of ammonia and fertilizer makers and for purposes where non-arsenical acid is not required is on the same basis; but for all other purposes the basic price is 5s. higher. De-arsenicated acid 140° is £4 15s., *plus* or *minus* 6d. per degree; for food purposes it is 15s. higher. The prices of rectified oil of vitriol range, for 90 p.ct. and under 91 p.ct., from £6 6s. 6d. (arsenical) and £7 14s. (de-arsenicated) to £6 17s. (arsenical) and £8 4s. 6d. (de-arsenicated) for 97 p.ct. and under 98 p.ct.

Carbonizing and Other Economies.

In the carbonizing industries, search is always proceeding to find new economies in the manufacturing processes. In "Stahl und Eisen," Dr. W. Wollenweber discusses various means by which economies can be effected in coking and bye-product practice. Passing over the part of the article in which he suggests that new coking plant should be built of silica and not of ordinary refractory bricks, it is seen that he treats of the considerable fuel saving to be achieved by reducing the moisture in the coal to be carbonized. In German practice, 13 p.ct. is the average, though some plants are working with from 8 to 9 p.ct. The writer takes as an illustration a 1000-ton plant; and hence it is easy to calculate that, by reducing the moisture by 4 p.ct., some 40 tons of water less per diem would have to be evaporated in the coke-ovens. That is a considerable quantity. A saving in steam would also be realized, owing to the reduced amount of water vapour to be dealt with in the ammonia plant. The life of the ovens, too, would be increased. The advantages of moisture reduction, therefore, appear to be manifold. Methods of lowering the moisture can be effected by reducing the dust in the coking coal, as it increases the moisture content of the washed coal, and by allowing the washed coal to drain for a longer period. Dr. Wollenweber also advocates in the ammonia process the use of a single separator as being more economical in steam than a number of small separating units. By this means there is also a saving in lime. The reduction of the percentage of ash in the coking coal, and hence in the coke itself, constitutes a saving; seeing that any loss incurred would be more than compensated by the increased value. The maximum ash in the coke should not exceed 9 p.ct.

Gas Coal Exports.

It is many years since the coal export market has experienced such conditions in regard to quantity as those that have ruled the last two or three months, though, of course, there are years when, for half the business now being done, the revenue was double the current amount. In July alone, no less than 5,063,763 tons of coal were exported, carrying a value of £5,579,538. It is the third time this year that the monthly quantity exported has exceeded 5 million tons. In July 1920, 2,096,996 tons were exported; the value being £8,928,455. In July 1921, 816,320 tons were shipped; the value being £1,559,649. The gas coal exported last month amounted to 725,897 tons, with a value of £771,107. Out of the total coal exports during the seven months (32,247,723 tons), 4,574,677 tons were gas coal, with a value of £5,038,800. Of course, exports to the United States and now Canada, with the increased requirements of Germany, account for the flights in rates for abroad.

Gas Coke Shipments.

Last month the gas coke sent abroad amounted to 54,516 tons, with a value attached of £74,629. In July 1920, the quantity was 80,091 tons, with a value of £501,123. In July 1921, only 1684 tons were shipped—the value £1979. During the seven months, 382,041 tons of gas coke left these shores, of value £563,157. In the corresponding period of 1920, 445,275 tons were exported; the value being £2,362,390! In the same seven months of 1921, 219,287 tons were shipped, with a declared value of £564,362.

Sulphate of Ammonia Exports.

Last month 7387 tons of sulphate of ammonia were exported, compared with 6510 tons in July, 1921. The total quantity shipped during the seven months of this year was 74,099 tons, as against 77,338 tons in the same period of 1921.

PERSONAL.

MR. W. E. PRICE.

Appointed Managing-Director of the Hampton Court Gas Company.

From every quarter in the gas industry, there will issue congratulations and good wishes to Mr. W. E. Price, Assoc.M.Inst.C.E., upon his elevation to the Board of the Hampton Court Gas Company, and his appointment as Managing-Director. Mr. Price had decided that the time had arrived when he should ask his Directors for relief from some of the routine duties attaching to his office of Engineer and Manager; and the Board at once recorded their appreciation of his long services, but without any intention of parting with him. On the contrary, they resolved to recommend the stockholders to place Mr. Price on the Board, and to appoint him Managing-Director. This the stockholders most cordially did at their meeting last week.

The name of Price has been associated with the office of Engineer and Manager of the Company for three score years and ten; and the period has been equally divided between our friend and his father (Mr. E. Price), though Mr. Price had been some eleven years with the Company prior to taking over the highest office—thus making in all 46 years. After being educated at private schools, "W. E." was articled to his father, on whose retirement (after 35 years' service) the son succeeded to the office. It is interesting to note that Mr. Edward Price lived almost throughout the tenure of the office by his son—dying only last year at the great age of 93 years. During the period of his service, Mr. W. E. Price has entirely rebuilt and modernized the works. A few figures will show the success of the management; and there is in them points which may be looked upon with envy by many managers in the southern part of England. In 1887, the make of gas was 90 millions; in 1921, it was 350 millions. In 1887, the price of gas was 4s. per 1000 c.ft.; in 1922, it is 10d. per therm, or 3s. 9d. per 1000 c.ft.—the declared value being 450 B.Th.U. The capital per million in 1887 was £761; in 1921 it was no more than £318.

In the organized work of the gas industry, Mr. Price has taken a very prominent part. As a matter of fact, he has been running very closely in this respect his old friend Mr. James Helps, and has occupied the same plane of popularity among his professional colleagues. Mr. Price was President of the Southern District Association in 1902, and Hon. Secretary from 1910 to 1913. He was elected Honorary Secretary of Institution of Gas Engineers in 1914, which position he still holds, and is likely to do so, judging from the enthusiastic unanimity with which he is re-elected year by year. He was one of the founders of the National Gas Council, and holds the office of Joint Honorary Secretary. A prominent part was taken by him in the formation of the British Commercial Gas Association; and he has served on the Executive Committee from the formation of this energetic organization. It is a good record of service both to the Hampton Court Gas Company and to the gas industry generally; and personally we felicitate him upon the new honour conferred by the former—an honour won, and so richly deserved.

Mr. Fred. Chadderton, the Manager of the Barrow Corporation gas and water undertaking, has tendered his resignation. For some time past he has suffered from indifferent health, necessitating two operations.

Prof. H. S. HELE-SHAW, D.Sc., LL.D., F.R.S., has kindly consented to succeed Capt. H. Riall Sankey, C.B., C.B.E., R.E. (retd.), as President of the Association of Engineers-in-Charge for the 1922-23 session. This is the second time the Professor has been President of the Association, he having occupied the chair in 1912-13.

Engineer Vice-Admiral Sir GEORGE GOODWIN, K.C.B., late Engineer-in-Chief of the Fleet, and Dr. JAMES COLQUHOUN IRVINE, C.B.E., F.R.S., Vice-Chancellor and Principal of St. Andrews University, have been appointed by an Order of Council, dated Aug. 10, 1922, to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

A Committee of all parties of the Manchester City Council have selected, subject to confirmation by the Council, Mr. Councillor WILLIAM CUNDIFF to succeed Mr. E. D. Simon as Lord Mayor, at the end of the present municipal year. Mr. Cundiff is Deputy-Chairman of the Gas Committee; and, as a member of a chemical firm in Clayton, his technical knowledge has been invaluable to the Committee.

Mr. F. R. O'SHAUGHNESSY, for 17 years Hon. Secretary of the Birmingham and Midland Section of the Society of Chemical Industry, has resigned, and is succeeded by Mr. G. KING. Mr. O'Shaughnessy not only revived the Section, making it a powerful and representative body, but was also responsible for the organization of two annual general meetings held at Birmingham. A testimonial is to be presented to him at the opening meeting of the forthcoming session.

We learn that Mr. R. W. HUNTER, the Chief Engineer at the Gas Light and Coke Company's Beckton Works, has been appointed Deputy Engineer of the Bromley Works of the Company. In recognition of his long connection with Beckton, extending for nearly 20 years, Mr. Hunter was presented with a silver tea and coffee service and salver by the workmen, and two silver candlesticks (Corinthian column pattern) by the Engineering and Clerical Staff at Beckton.

In celebration of Mr. G. L. SWALLOW's jubilee of service under the Newcastle and Gateshead Gas Company (as noticed in the "JOURNAL" for Aug. 16, p. 370), a presentation was made, at the Elswick Gas-Works, by the workpeople. Mr. Frank P. Tarratt, the Chief Engineer, occupied the chair, and on behalf of the subscribers presented Mr. Swallow with a silver cake basket, suitably inscribed, and with a pipe and tobacco. Mr. Wilson, shop steward, and Mr. Harry Millington, also paid tributes to Mr. Swallow, who briefly returned thanks. The Directors of the Company also have made a suitable presentation to Mr. Swallow.

OBITUARY.

CHARLES EDWIN JONES.

Time between the receipt of the sad news and the going to press of the "JOURNAL," did not permit of anything but the very briefest announcement of the death of Mr. Charles Edwin Jones, of Leyton, who, during a long and active life, was a well-known personality in the gas profession, among the members of which he had a large number of friends. As already intimated, he passed away on the 12th inst., at the ripe age of 83.

Though, perhaps, best known in the Midlands, on account of his 26 years' management of the Chesterfield Gas and Water Works, Mr. Jones will long be remembered by all regular attendants at the annual meetings of the Institution of Gas Engineers, who became accustomed to look for some genial and encouraging remarks from him on these occasions. In reality a veteran, he could look back upon the Presidential Addresses of half-a-century. As a matter of fact, the esteem in which he was held by the Institution was strikingly manifested in October, 1918, when Mr. W. T. Dunn (the Secretary) wrote a letter offering him, in the name of the President, Council, and members of the Institution, their very sincere congratulations on the attainment by Mr. Jones of his eightieth birthday. Mr. Dunn added: "It is felt that such a happy event should not be allowed to pass without this expression of the Institution's best wishes for your continued happiness with Mrs. Jones, who, as you have told me, has been your guide and counsellor; and we would include her in our good wishes." Some four months earlier in that year, there had been other congratulations to Mr. and Mrs. Jones, on the celebration of their "golden wedding." Now there is as sincere condolence with the widow on her bereavement.

Before coming to London to practise as a consulting engineer, Mr. Jones was, as stated above, for more than a quarter-of-a-century Manager of the Chesterfield Gas and Water Works, which, when he first became connected with them, were in the hands of a private Company. In 1894, however, the Company promoted a Bill to sanction an extension of their area; and this met with so much opposition at the hands of the Chesterfield Corporation and the neighbouring local authorities, that the Select Committee to whom it was referred declined to pass the preamble. The Committee gave expression to their opinion that the supply of gas and water should be undertaken by the Corporation; and it was intimated during the proceedings that, if the Bill were not passed, the Corporation would apply for authority to do so. Thereupon the Committee said they should require the Corporation to promote a Bill in the succeeding session of Parliament for power to purchase the Company's undertaking on fair and reasonable terms. This was done, and resulted in the formation of the Chesterfield Gas and Water Board. After the transfer of the works, Mr. Jones was retained for some years as General Manager, but resigned in 1897.

Our late friend was well known both in and around Chesterfield, and filled several public offices. He was at one time Vice-Chairman of the Poor Law Guardians, a member of the Local Board of the township in which the gas-works were situated, and Chairman of the School Board. For some years he was a member of the Chesterfield and Derbyshire Institute of Mining, Mechanical, and Civil Engineers, to whose transactions he contributed a series of papers. He also enjoyed a considerable private practice in connection with gas and water undertakings. On various occasions he was retained to give evidence before Parliamentary Committees and in the Law Courts. In 1905, he was appointed a representative of the Staveley Coal and Iron Company, Ltd.

Mr. Jones was admitted into the British Association of Gas Managers as long ago as 1874, and subsequently passed into the Gas Institute. For a number of years he served on the Council, and also showed his interest in the work by contributing papers. He further read papers and joined in discussions at meetings of District Associations of which he was a member—the Manchester District Institution of Gas Engineers (of which he was President in 1886), the Midland Association of Gas Engineers and Managers, and the Eastern Counties Gas Managers' Association (of which he was President in 1892). His membership of these three District Associations ceased in 1897 and 1898. On the other side of his professional work, Mr. Jones was one of the original members of the British Association of Water Engineers, serving upon the Council from its formation in 1896 until 1906. He was also an associate member of the Institution of Civil Engineers, having been admitted in 1886. In addition to the reading of papers before technical organizations, Mr. Jones was the author of various pamphlets on gas and water subjects; and several articles from his pen will be found in back volumes of the "JOURNAL."

The death has occurred of Mr. THOMAS REILLY, late Manager of the Strabane (Co. Tyrone) Gas-Works.

The funeral took place at Arundel, on the 22nd inst., of Alderman CHARLES BARTLETT, who died at Brighton on Aug. 15, in his 72nd year. Mr. Bartlett, Father of the Town Council, was Chairman of the Arundel Gas Company and a man of wide local activities; and his death is mourned by many throughout the county. The respect shown by all on the occasion of his funeral testified to the esteem in which he was held. Representatives of the Littlehampton as well as of the Arundel Gas Company attended the funeral.

Mantle Lighting with Acetylene.

Mr. Charles F. Rockstroh, of St. Albans (N.Y.) has, after long experimenting, made a mantle for use with acetylene gas, by which he claims that the tint of the light of the open acetylene flame has even been improved upon, by the production of a much whiter light. The "Rock Light" burner, with which the mantle is used, is designed to ensure complete combustion of either purified or crude acetylene, and will not, it is said, carbonize under any operating pressure, though naturally the mantle will last much longer with purified than with crude gas. The burner, which is of brass, consists of four parts, and is so arranged as to give a vortex motion to the issuing gas, and to assist in mixing it with the injected air. The mixture at once enters, by a conical passage, a constricted portion of the mixing tube—this constriction being essential. At the upper end of the tube, the area again increases, and the mixture passes through a fine gauze, which is bent downwards near the circumference, and up in a cone in the middle. Above this cone is the solid head of the cap, through a round opening in the centre of which the mixture escapes, and burns inside the mantle. This mantle is 1¼ in. long, and about $\frac{1}{16}$ in. in diameter. It is hung by a loop from the top of a specially designed mica chimney, the chimney and mantle being supplied ready for use. The chimney is 2 in. high, and 1⅛ in. in diameter, with air-holes in the base directing the current towards the mantle. Tests of the system show a great increase in lighting power, there being, at about the same consumption, about twelve times as much illumination as an open-flame burner would give.

"B.C.G.A."—The annual conference will be held at Bristol on Oct. 16-18.

Manchester and District Junior Gas Association.—We learn from the Hon. Secretary, Mr. J. Alsop, that the members of the Association will be visiting one of the working pits of the Wigan Coal and Iron Company, Ltd., on the 6th prox. Representatives of the Company will meet the party at Howe Bridge Station at 2.32 p.m., and will conduct the visitors to the pit. The invitation by the Company includes a tea, after which Mr. T. G. Dobb (the General Superintendent of the Collieries) will read some notes on "Coal and Coal Working." A discussion will follow; and to facilitate questions and comments, the notes are printed before the visit in this week's issue of the "JOURNAL," see p. 476.

ELECTRICITY SUPPLY MEMORANDA.

The electrical papers have shown a considerable amount of interest in the high gas bill discussion; and they have largely focussed attention on the therm. It agitates them to think that gas undertakings are supplying 100,000 B.Th.U. in different places for from (say) 7d. to 1s., and that 9d. is getting quite a common price, while they are charging under lighting rates anything up to 10d. or 1s. for 3420 B.Th.U., and under heating rates from (say) 1½d. to 2½d. If supplied at 1d., electricity would only furnish 30,780 B.Th.U. for 9d. In this is the secret of their delight over the high gas bills campaign, in which electrical heads and hands, there is good reason to believe, have taken a part. The "Electrical Times" has a paragraph with the same side heading as that given here—"Therm-inological Inexactitudes." It does not take credit for the invention of the heading; but it may take credit for the title being very applicable to its own therm wanderings. It seems to overlook absolutely the question of viewing matters in correct proportion. The complaints of high gas accounts are few compared with the 8 million or more gas consumers in the country. Gas undertakings could quote many more users of electric-fires who have changed over to gas-fires on account of high cost than the total number of letters of complaint as to gas that have appeared in the papers. "The therm," says our contemporary, "is irrevocably discredited in the eyes of the public." Let there be no mistake about that. The complaints of high accounts for gas are not representative of the total number of consumers, and so not representative of the public. What is more, the daily papers have published by no means all the letters they have received; and there has been a fair amount of bias in the selection of the letters that have been published. It forgets the fact too, or it does not mention it, that the gas industry is quite prepared to have an inquiry, if officially and disinterestedly conducted. The books of the companies contain a large amount of evidence refuting the stupid assertion that the therm is at the bottom of such trouble as there has been. However, our contemporary thinks that the "gas undertakings have largely themselves to blame." For what? For instituting the therm system? Let us say once again, as the repeated statement has not been noted by our contemporary, that the therm system is a child of the Fuel Research Board, adopted by the Board of Trade, and which adoption was endorsed by Parliament. The charging for value instead of volume was an innovation; and many gas undertakings were chary about applying it. But Parliament has ordained that all statutory gas concerns should transfer their business from volume to heating value. How then can it be said that gas undertakings have largely themselves to blame?

Therm-inological Inexactitudes.

Then more of the same weak condemnation. Says the writer in the "Electrical Times": "The continual changes in the declared calorific value of the gas, the initial high tariff per therm, the practice of continuing to measure gas by volume while charging by heat—all these tactics combined have exasperated tens of thousands of gas consumers." The "tens of thousands" is splendid as an "inexactitude." Another is the "continual changes in the declared calorific value of the gas." No gas undertaking has changed its declared value more than once. Charging by thermal value is all an innovation; and each gas undertaking has had to feel its way, in order to ascertain the value that, in its current circumstances, it can best supply. No industry could face such a change, and get on to a definite basis without experience and experiment. The declared value has nothing to do with the matter—at any rate, not within the limits of the changes that have been made. Our contemporary admittedly does not know anything about thermal efficiencies, or it would not have written such nonsense. The consumer pays for a therm, and gets it. Then there is the initial high "tariff" per therm. The Board of Trade has investigated the question of the correct standard or maximum price for each gas undertaking; and the Department has the power of revision, when circumstances warrant. But the electricity industry must not forget, even though economical in its sympathy, the long dreary years in which much of the capital of the gas industry was receiving £2 12s. 6d. and 3 p.ct., owing to the operation of the sliding-scale. Then there is the allegation as to measuring by volume while charging by heat. But the fact is overlooked that the calorific value is measured by examiners independent of the gas suppliers, and representing the public; so that the consumers have the advantage of measurement not only of gas volume by the meters, but of heating quality by calorimeters. These are the "tactics" ascribed to gas undertakings that are supposed to be exasperating the public. Instead of accepting the platitudes of laymen in these matters, why does not "Meteor" examine for himself the therm basis of charging, and tell us exactly what there is wrong about it. If electricity were used by the masses for heating and cooking purposes—what an electrical account storm there would be in the newspapers! The paragraph in our contemporary concludes as follows: "We look to see during the autumn a decided acceleration in the growth of electric heating and cooking loads. Who could have dreamed that the gas industry would have given so magnificent a free boost to electricity!" We are not perturbed.

And Still More.

We are always interested in what Mr. J. W. Beauchamp, the Director of the Electrical Development Association, has to say, because naturally he makes a comprehensive study of the subjects which come within his particular province. He has written to "Electrical Industries" on the subject of "Pot-Boiler's" letter, to which we referred last week. He does not think that correspondent is an individual, but a crowd. The "crowd," we take it, are those electrical doubters regarding electric cooking who are found thickly placed in the electricity industry. But Mr. Beauchamp says he finds that from those doubters there arise from time to time the most energetic propagandists of the electrical movement. He has in mind an electrician who, but a few years ago, thought only in calories and therms and other bogies of that kind, but to-day is fixing electric-ranges in his district at the rate of about a hundred a year. It is the first time that we have seen or heard a definite physical quantity such as a calorie or a B.Th.U. called a "bogey." It is not scientific so to regard a heat unit; and if Mr. Beauchamp was right, away would go all the basis on which our efficiencies stand. The Director of the "E.D.A." ought not to descend into such base or loose designation, but should, representing a highly scientific industry, treat physical quantities with the respect that is their due. He regards "Pot-Boiler's" figures as to the consumption of electricity as being distinctly on the high side. He suggests that the cooker users could probably substantially reduce their consumption by employing a kettle with a self-contained element. There is an admission underlying the suggestion. It is that the hotplate of the electric-oven is a wasteful contrivance. Anyway it does not say much for the heating elements on the hotplate. If a "kettle," why not self-contained pots and pans? Several other utensils besides kettles are used on the hotplates. But these self-contained utensils are very expensive, not only in their first cost, but to repair. The need is emphasized for scrupulous care with electric heat units that are so costly. More thought is urged with regard to the arrangement of cookery, utilizing residual heat, &c. Mr. Beauchamp is quite aware that the average cook, whether mistress or maid, is not accustomed to this sort of thing; but he believes that they will come to it if "we" have a little patience. We are afraid that the relative cheapness of gas heat units is partly responsible for habitual waste. The gas industry would be glad, however, if householders would exercise more care. What is, however, found is that no matter how much the money value of attention to details is impressed, the lesson is soon forgotten. Mr. Beauchamp cannot agree that electricity need be sold as low as 1d. or 1⅛d. per unit against 5s. for gas. There is already a large cooking business in London at 1½d., against 5s., and some at 1d.—the latter being "reported" as very distinctly cheaper than gas, without the exercise of any particular care. What does Mr. Beauchamp mean by a "large" electric cooking business? At the end of last year, there were 1,104,552 gas-stoves on hire in the areas of the three London Gas Companies. How do the electric undertakings in the same area compare with this? As to electric units at 1d. being distinctly cheaper than gas at 5s., why does not Mr. Beauchamp to-day deal with therms at 9d., 10d., and 11d.? At 10d. per therm, for a penny he can buy 10,000 B.Th.U., against 3420 B.Th.U. for electricity at 1d. To make his assertion stand, the over-all efficiency of the gas-stove—oven and hotplate—has to be reduced to 30 p.ct., and the electric-stove—oven and hotplate—has to show 100 p.ct. efficiency. On the hotplate of the gas-oven, about 80 p.ct. of the work is done; and with boiling-rings on the modern open-top hotplate, at least 60 p.ct. efficiency can be secured.

Mr. Beauchamp on Cooking.

There are other matters in the letter which are worthy a little attention. The secret of building-up the cookery load consists, Mr. Beauchamp says, in enabling the consumer to get the apparatus on reasonable hire terms; and, in his enthusiastic mind, or in compliance with his duty to afford encouragement, he asserts that the hire terms need not be so low as those charged for gas apparatus, but they "must bear reasonable comparison with them." Then, in addition, service work is necessary. Of course it is—particularly with electricity. Instruction must be given to users, faults must be dealt with promptly, and a little tactful and sympathetic attention given from time to time to see that the apparatus is in proper condition, and that the users are getting the utmost value out of it. Of course, all this is more important with electric-cookers than with gas-cookers, in view of the simplicity of the latter and the complication of the former with switches, wires, fuses, and heating elements. Mr. Beauchamp mentions certain districts in which "considerable" experience has been gained with electric cooking—not only on rates for hire and for supply, but also in connection with the mains problem. "Considerable" is a term to which people give wide meanings. We refer to gas-cooker connections as being "considerable," and so should not thus regard electric-cooker connections. As to the "mains problem" owing to cooking, this has not with electricity developed to any really appreciable extent; and anyway the "mains problem" will not be the same in different places. According to the social conditions of a neighbourhood, demands

Other Points.

for gas cooking vary in their incidence, and so they will in relation to electric cooking. As to the initial cost of electric-stoves, Mr. Beauchamp points out that this will decrease with demand. He makes another interesting statement. It is this: "Gas is employed very widely—not because it is cheap, or because people like it, but because it is quick, saves labour and trouble." Electricity, he adds, "far excels" it in these directions. That is amusing. Is it the truth that electricity is quicker? It is not. Is electricity a greater saver of labour and of trouble? The trouble that has been caused through electricity collapses and defective elements is one reason why gas-cookers have so frequently not been banished from kitchens where electrical operation has been tentatively employed. Mr. Beauchamp also says that electricity has the immense further advantage that the unit is a definite and unadulterable amount of energy, and the efficiency of the electrical apparatus is constant. Is not a B.Th.U. a "definite and unadulterable amount of energy?" Is it true that the efficiency of electrical apparatus is constant? The general experience of heating elements is that they depreciate in efficiency. Mr. Beauchamp's experience, however, would appear to be quite unique.

How the Public are Edified.

The "Fifeshire Advertiser" prides itself upon its recognition that the scope of journalism extends to the supply to the public of "accurate information on technical matters." That is excellent, so long as the information on technical matters is "accurate." A representative of the paper has been having a talk with the technical department of Messrs. Moncrieff Bros., electrical contractors, of Burntisland, and has given the result of what he learned in an article. A correspondent has sent us a copy. We cannot traverse with comment the whole article, but may refer to two or three of the outstanding points. One of the pieces of "accurate" information apparently gathered from the technical department of the firm named is that electricity at 7d. per unit is equivalent to gas at 4s. 4d. A metallic filament electric-lamp consumes more than 1 watt per candle power—1·25 watts may be taken as a fair average. A unit of electricity at 1·25 watts will therefore give 800-candle hours, until deterioration of the lamp sets in. It is quite easy to obtain and to maintain 20 candles per cubic foot of 500 B.Th.U. gas by the use of an inverted burner. Inasmuch as 7d. will buy 133 c.ft. of gas at 4s. 4d. per 1000 c.ft., it is readily seen that at 20 candles per cubic foot 2660-candle hours are realized. There is a big difference between 800 and 2660. The danger of fires through the dropping of matches is alluded to. But the danger from electric wire fusions is not mentioned among the "accurate" information. There is reference to the effect on the "delicate optic nerves" of the employment of high-power electric-lamps—such effect "as used to be experienced with incandescent gas lighting." The "accurate" information does not include any mention of the great difference there is between the intrinsic brilliance of electric-lamps and incandescent gas-lamps, which makes the former far more harmful to the eyesight, unless proper protection is provided, than the latter.

Further Inaccuracies.

Another piece of so-called "accurate" information is that "electricity during the past few years has slowly superseded gas for cooking." Singularly, we have not observed this supersession. There are between 5 and 6 million cookers and grillers in use in Great Britain and Ireland; and the number continues to increase. This does not look as though electricity has superseded gas-cookers. We should advise the "Fifeshire Advertiser" to ascertain how many electric-cookers are in use in Great Britain and Ireland, so that comparison can be made with the millions of gas-cookers in use. There is a silly reference to a higher percentage of "evaporation" when meat is cooked in a gas-oven than when cooked in an electric-oven. What is it but water that is evaporated? Perhaps to enhance the accuracy of his information, the representative of the paper in question will inquire of his informants why, assuming equal temperatures are employed in cooking, gas should cause more evaporation from meat than electricity. Heat is heat no matter the agent generating it. The effect of heat on meat varies only with the temperature; and therefore at regulated equal temperatures, with the joints also showing an equality in characteristics, there should be no differences in results. Figures are included in the article (of no more recent date than 1915 and 1916) which show that, at 1½d. per unit, the electricity used for cooking by a consumer costs less than the gas burned in corresponding quarters—the charge being 3s. 2d. per 1000 c.ft. It is not stated how the gas consumer estimated the part of his account that referred to cooking; we hardly imagine he had a special meter put in for the purpose. The amount of heat that can be obtained at the price is known, as well as the relative efficiencies obtainable; and these prove conclusively that the same quantity of work was not done by electricity as was done by gas. Such comparisons as that published by the "Fifeshire Advertiser" are of no use whatever. One of the soundest pieces of advice in the article is: "To obtain the best results with electric cooking, only the latest cooking apparatus should be purchased." As to electric heating, very fairly the information is given that it is not recommended for continuous use—only intermittent.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Programme of the Meeting.

We have received from Mr. David Fulton (the Secretary of the North British Association of Gas Managers) the programme of the Annual Meeting to be held on Thursday of next week in the Town Hall, Ayr. The President is Mr. Charles Fairweather, of Kilmarnock. At the opening of the proceedings, there will be merely formal business; and then the President will deliver his Address. At the afternoon sitting, there will be a discussion on the papers read at the Spring meeting, together with the presentation of one by Mr. G. H. Gemmell, of Edinburgh (the Official Analyst to the Association) on the subject of the "Valuation of Oxides for Gas Purification." [At the request of Mr. Fulton, we are publishing Mr. Gemmell's paper in this week's issue of the "JOURNAL" (see p. 471), in order that the members may become acquainted early with its contents.] The proceedings will conclude with other formal business, including the presentation of the President's medal. In the evening, members and friends will dine together in the Town Hall. The following day, there will be a char-à-banc tour to Ballantrae, going by the shore road *via* Turnberry and Girvan, returning inland *via* Colmonell, Girvan, and Maybole. This is a magnificent run of slightly over 70 miles through beautiful scenery. Lunch will be taken in the King's Arms Hotel, Girvan.

ANNUAL REPORT.

The following extracts are taken from the annual report of the Council for the year 1921-22.

MEMBERSHIP.

The membership of the Association on June 30, 1922, was 252, as compared with 256 at the close of the previous year—a decrease of 4.

The following applicants for membership have been passed by the Council, and are recommended for election at the annual general meeting. Ordinary Members—Messrs. J. E. Blundell, Carlisle; David Vass Reid, Huntly; David Robb, Hamilton; J. Robertson, Cardenden; and W. Young, Stranraer. Extraordinary Members: Messrs. Jas. F. Cameron, Glasgow; D. B. Galloway, Glasgow; H. Blakeley, Leeds; L. Fletcher, Glasgow; and Thomas Wilson, Glasgow. Associate Member: Mr. James Stevens, Maybole.

INSTITUTION OF GAS ENGINEERS' DELEGATE.

Mr. Charles Fairweather, Kilmarnock, has been appointed to represent the North British Association of Gas Managers on the Council of the Institution of Gas Engineers for the year 1922-23.

COMMERCIAL SECTION.

Western District.—The membership of the section for the past year was 54. There were twelve meetings during the year, all of which were held in Glasgow under the able presidency of Mr. Robert Simpson, Gas Engineer, Cambuslang. The action of the section in introducing and distributing coal from America proved a great benefit to members, and allowed all works to carry on until the close of the strike. The beginning of the past year also saw a resumption of coal deliveries after the great coal strike, and, by arrangement, meetings were held in July and August. These were very helpful to members in dealing with the abnormal conditions in coal prices and deliveries. The section has since given a great deal of consideration to policy as regards the purchase of coal, either from day to day or by contract, and the decisions of the section have been generally followed by the various members. The disposal of coke has also presented many difficulties, as, with the depression of trade, stocks accumulated in the larger works, curtailing prices very considerably. Following the slump in tar and sulphate of ammonia early in 1921, prices and outlook for these residuals were somewhat uncertain at the beginning of the season's work, but they gradually steadied and are now firm and improving. The utility of the section is well illustrated by the wide range of subjects discussed at its monthly meetings.

(Signed) ARCHIBALD KELLOCK,
Hon. Secretary.

North-Eastern District.—During the past year five meetings have been held at the undernoted centres—Dundee, Burntisland, Forfar, Kirkcaldy, and Brechin. The average attendance was fifteen, somewhat below the previous year; this being no doubt due to the difficulties under which many managers are working since the coal strike, together with poor travelling facilities. Considering the distance which separates many of the members, the attendance is very fair. Notwithstanding the smaller attendance, the interest of the members is being kept up, and helpful discussion takes place from time to time.

(Signed) R. S. JOHNSTONE,
Hon. Secretary.

FINANCIAL REPORT.

The expenditure from the general fund amounted to £244 14s. 10d., and the income to £304 4s. 8d. There is, therefore, a credit balance of £59 9s. 10d. on the year's working. The Council have decided to repay the remainder of the loan taken from the William Young Memorial Fund, amounting to £37 18s. 4d., *plus* the sum of £4 16s. 1d. as interest on the total loan, which leaves the sum of £16 15s. 5d. at credit of the general fund. Interest has been

paid at the deposit receipt rates ruling over the period of the loan.

During the year ended June 30, 1922, the sum of £50 was granted from the Benevolent Fund to the widow of a member, and an allowance of 10s. per week was granted for a period of one year to a member. The amount at credit of revenue account is £380 1s. 8d., and £586 4s. 9d. is invested in North British Railway 3 p.ct. debentures.

Voluntary subscriptions to the research fund amounted to £13 6s. 6d.; and the credit balance in the bank is £15 2s. 2d.

The amount at credit of the William Young Memorial Fund is £104 2s., which includes the sum repaid by the general fund. The sum of £654 14s. 3d. is invested in North British Railway 3 p.ct. debenture stock. The expenditure from this fund during the year was £33 18s. 1d.

OFFICIAL ANALYST'S REPORT FOR THE YEAR.

As Official Analyst to the Association, Mr. G. H. Gemmell, F.I.C., reports that during the year he received the undernoted samples for analysis:

Sulphate of Ammonia . . . . 16 *samples.*

Strength.	Maximum P.Ct.	Minimum P.Ct.	Average P.Ct.
Ammonia	25·59	24·65	25·10
Sulphate of ammonia	90·32	95 69	97·43
Moisture	4·06	0·46	2·19
Free acid	0·538	0·098	0·21

Ammoniacal liquors	16 samples.
Dehydrated tar	1 sample.
Deposits from mains, &c.	5 samples.
Oils	1 sample.
Lime shell	1 ,,
Waters	1 ,,
Oxides for purification	8 samples.
Spent oxides	19 ,,

Strength	Maximum P.Ct.	Minimum P.Ct.	Average P.Ct.
Sulphate on dry basis	56·25	17·66	36·32
Moisture	27·84	4·96	18·94
*Prussian blue on dry basis	14·06	0·517	5·56
Tar	4·90	0·24	2·51

*Expressed as crystallized ferrocyanide of potassium.

Note.—The standard method for estimating sulphur and tar in spent oxide, as described in the "GAS JOURNAL," April 20, 1920, has been found to work satisfactorily, and no marked difference between buyer's and seller's analyses has been reported.

There is no agreed upon or standard method for the estimation of cyanogen in spent oxide. In the method used by us, the total cyanide, whether present as Prussian blue $Fe_7(CN)18$ sulphocyanide, or other cyanogen compound, is estimated and reported as crystallized ferrocyanide of potassium. By another method, only the cyanogen present as Prussian blue is estimated and reported as such. The buyers hold that the latter is the correct procedure, as it is only the Prussian blue that is available for conversion into the marketable salt, ferrocyanide. By the first method, not only is the estimate of cyanide greater than by the second, but the ferrocyanide as reported is 1·46 times the Prussian blue. It is desirable that a standard method for estimating and reporting cyanogen should be agreed upon.

WILLIAM YOUNG MEMORIAL LECTURE.

The Council have decided that no William Young Memorial Lecture shall be delivered at the annual general meeting to be held in Ayr on Thursday, Sept. 7.

RULES AND CONSTITUTION.

It was stated in last year's report that the Council had under consideration the question of revision of the Rules and Constitution of the Association. A number of special meetings to consider the matter have been held during the year by a Sub-Committee of the Council, and, after very careful consideration, several suggested alterations of rules have been unanimously approved by the full Council, and are recommended to the members for adoption. [These are given in the printed report as circulated among the members.]

The effect of the alterations to the rules suggested is to permit of the addition of a new class of member—viz., life members, and to place the selection of the Junior Vice-President in the hands of the Council.

Present and past Councils have felt that a life member's class is necessary to enable them to retain as members gentlemen who may have retired from the gas profession after having been connected with the Association for a long period of years.

The present method of selecting the Junior Vice-President by all the members voting between two, generally, equally suitable members is felt by nearly everyone to be very invidious, and the Council believe that the new method suggested is a distinct improvement, and would be found to operate with advantage to the Association. It is the method adopted by practically every other Association in the United Kingdom.

The alteration of rule carried at the annual general meeting, 1920, by which nominations for ordinary members of Council are made at the spring meeting, the ballot taking place at the succeeding annual general meeting, leaves the selection of members of Council in the completest possible way in the hands of the members.

ANNUAL SUBSCRIPTIONS.

The Council have had before them the question of making a reduction in the amount of the annual subscription; but the matter is still under consideration.

MR. JOHN F. BLACK, NEWPORT.

The Council greatly regret that the claims of business have prevented their esteemed colleague, Mr. John F. Black, from going forward as Senior Vice-President, and place on record their appreciation of his valuable services to the Association as Councillor and Junior Vice-President.

(Signed) DAVID FULTON,
Secretary and Treasurer.

CITY AND GUILDS EXAMINATIONS PROGRAMME.

IN the "JOURNAL" for the 2nd inst., there was given a list of the successful candidates in this year's Gas Examinations held under the auspices of the Department of Technology of the City and Guilds of London Institute. Those whose ambition it is to see their names in the corresponding lists next year will no doubt give careful attention to the report on the examination results, prepared by the Institute (with extracts from the Examiners' reports), and published on the same page [264] of the "JOURNAL" as the pass lists. Directions in which improvement is possible were pointed out there which it will profit prospective candidates to study. They will also secure much necessary information from a perusal of the programme for the session 1922-23 of the Department of Technology of the Institute, containing general regulations and syllabuses for examinations in technological subjects, which has just been published by John Murray, of Albemarle Street, W., at the price of 3s. 6d. net (postage extra). Copies of the programme may be obtained through Messrs. Lamley and Co., Nos. 1 to 5, Exhibition Road, London, S.W., or any bookseller; but all inquiries relating to the work of the Department should be addressed to the Superintendent, Department of Technology, City and Guilds of London Institute, No. 29, Roland Gardens, S.W.

A list is given of the chief alterations contained in the programme, and from this it is noted that the syllabus for the final practical examination in Gas Fitting has been modified in some details. The names of members of the Advisory Committees are set out, and, in addition, the Institute state that they are able to avail themselves of the advice of, among other bodies, the Institution of Gas Engineers. Mr. Charles Hunt is still an Honorary Consultative Examiner in connection with Gas Manufacture; the Acting Examiners for the year 1922-23 in the subjects in which "JOURNAL" readers are interested being: Coke and Bye-Products Manufacture, Mr. C. P. Finn; Coal-Tar Distillation and Crude Intermediate Products, Mr. W. H. Coleman; Gas Engineering, Mr. S. Tagg; Gas Supply, Mr. H. Kendrick; Gas Fitting, Mr. R. J. Rogers; and Heating and Ventilating Engineering, Mr. A. H. Barker.

The following are the dates of next year's examinations: Coke and Bye-Products Manufacture, Wednesday, May 2; Coal-Tar Distillation and Crude Intermediate Products, written, Thursday, May 3, and practical, Saturday, May 5; Gas Engineering, Saturday, May 5; Gas Supply, Saturday, May 12; Gas Fitting, written, Monday, April 30, and practical, Saturday, April 28; Heating and Ventilating Engineering, Wednesday, May 2. Together with the syllabus, there is given a list of text-books and works of reference for students on the subjects of the different examinations, as well as the names of appropriate periodicals.

The Society of British Gas Industries once more offer special prizes of £5 5s. and £2 2s. to the first and second candidates respectively at the Final Examinations in Gas Engineering, Gas Supply, and Gas Fitting, provided that such candidates are eligible under the regulations. The Coke-Oven Manufacturers' Association offer prizes of £3 3s. and a silver medal, of £2 2s. and a bronze medal, and of £1 1s., to the first, second, and third candidates respectively at the Final Examination in Coke and Bye-Products Manufacture. For the examination in which they are interested, the Institution of Heating and Ventilating Engineers put up prizes; while the City and Guilds of London Institute offer silver medals on the results of the Final Examination, and bronze medals in the grade below, in all technological subjects.

Cause and Prevention of Deterioration of Portland Cement.—The United States Bureau of Mines have, says Mr. W. M. Meyers, writing in the "Journal of the Franklin Institute," completed an investigation of the cause of the deterioration of portland cement during storage and transportation, and suggest means for preventing such waste. French manufacturers recognize the deleterious effect of climatic conditions on portland cement, and endeavour to send their product direct to the point of consumption. The Bureau propose two improvements in the practice of handling cement: (1) Storage and transportation of the cement in bulk; (2) storage and transportation of the cement in the form of unground clinker, grinding to be done at destination. The first method results in a decrease in hydration of cement, as the exposed surface is less. Shipment should be made in a tight closed car, and the cement at all points protected from moisture. The second method has the distinct advantage that the quality of cement produced from stored clinker is higher, on account of hydration of free lime in the clinker; and the grinding cost is lower, because the mechanical disintegration of clinker during storage makes grinding easier.

THE VALUATION OF OXIDES FOR GAS PURIFICATION.

[A Paper to be read at the Meeting at Ayr, on Sept. 7, of the North British Association of Gas Managers].

By G. H. GEMMELL, F.I.C., Official Analyst to the Association.

The Technical Press, during the past few years, has published many articles dealing with oxide purification. An examination of these articles shows that the reaction between oxide of iron and sulphuretted hydrogen is not completely understood, and is not the simple reaction: $Fe_2O_3 + 3H_2S = Fe_2S_3 + 3H_2O$, and $Fe_2S_3 + 3O = Fe_2O_3 + 3S$. Iron oxides from different sources are not all equally active. The purifying material may contain oxide of iron incapable of reacting with sulphuretted hydrogen, or the reaction may be slow and the revivification slow. I have tested an oxide of iron absolutely inert to H_2S; and though the conditions were varied by rendering it alkaline, raising the temperature, &c., none of the gas was absorbed. There are various factors which at once suggest themselves as a possible cause of the variable results, either with regard to the activity of the material or the difficulty of obtaining a fair percentage of sulphur in the fouled oxide.

It might be well here to state what is generally understood by the terms "activity" and "capacity." Weyman has defined "activity" as the percentage of H_2S absorbed by 100 parts of ferric oxide present, divided by the theoretical amount—viz., 63·9 p.ct.—which it is capable of absorbing. It is a matter of common observation that some oxides very readily absorb H_2S, so much so as to raise the temperature almost up to firing point. When this rate of absorption is rapid, we term the oxide "active." From examples which I shall give, it will be noted that some of the oxides are active at first, and then slow down; others, again, are only slightly absorbent at first, but after partial fouling the activity increases. The total quantity of sulphuretted hydrogen capable of being absorbed is the capacity of the oxide. Among the factors which may affect the absorptive activity and capacity of the oxide are: Its physical condition, the temperature of the reacting bodies, the percentage of free and combined water, and the influence of other constituents in the oxide, notably the acidic or basic constituents. In addition, there is the effect of ammonia, cyanogen, tar, and other constituents in the gas itself. For example, it has been shown that the efficiency of an oxide is increased if sufficient ammonia is present in the gas to keep it alkaline, and that by a small but controlled supply of ammonia the life of the oxide is extended. The presence of excessive water and a low temperature tends to the formation of $FeSO_4$; and under certain conditions, thiophenes and other permanent compounds of sulphur are formed. Cyanogen, by combining with iron, reduces the capacity of the oxide for removing H_2S.

THE BEST OXIDE TO PURCHASE.

Though all these factors have been investigated, we are still in the dark as to the best oxide to purchase, and gas engineers have largely to rely on their past experience, or on that of others. It appears to me, therefore, that it is advisable to consider whether it would not be possible to agree upon a standard of value upon which engineers could purchase their oxides. I have had a number of oxides sent to me by firms desirous of introducing their product and obtaining a certificate as to its efficiency, also samples from various gas engineers themselves who wished before purchasing to have a guarantee that the oxide was suitable for their requirements. In carrying out these tests, I soon arrived at the conclusion that the estimation of water and oxide of iron content did not give sufficient data in arriving at the value of the oxide, and that a laboratory fouling test, combined with the above, was necessary to obtain a true valuation. Most of the fouling tests recommended consist in passing sulphuretted hydrogen, in excess, once through a weighed quantity of the oxide, and noting the proportion of sulphur retained.

My experiments have been carried out with a view to determining, if possible, the maximum quantity of sulphur which an oxide would take up after repeated foulings and oxidations, the final weight of the fouled oxide, the weight of sulphur in the final product per 100 parts of oxide taken, and the ratio of sulphur absorbed to the oxide of iron originally present. These, I take it, are the particulars a gas engineer wants to know. If an oxide will absorb up to 50 or 60 p.ct. of its final weight, and the oxide of iron is reasonably active, then the higher the percentage of sulphur in the fouled oxide, and the greater the gain in weight, the better it is suited for its work. It has been objected that in laboratory methods the conditions are so dissimilar to actual working operations that they are of little value, and that the only correct method is to pass foul gas through the oxide in the works itself. While this method may give a true indication of the usefulness of the oxide, the time taken to carry out the test is too long to make it universally practicable. The tests carried out by my method give, with good bog ores, results corresponding to those obtained in actual practice, and provide ample evidence of reliability. Table I. shows the results of fouling tests with ten oxides, seven bog ores, and three artificial oxides.

In my earlier trials, many of the results were unsatisfactory, and changes in the apparatus and procedure were gradually evolved, also in the quantities, the method of fouling, the gases used, time, temperature, &c. My present procedure is to employ 100 grams of the oxide (of which a partial analysis is also made). This is placed loosely in a tower, as sketched, and the gas slowly passed upwards through the mass at room temperature. The gas used is: 1 part of air, 2 parts of washed sulphuretted hydrogen, and 7 coal gas, mixed in a gasholder of 10 litres capacity. The mixed gas is slowly forced from the holder by admitting a regulated flow of water, and is washed, either in water or in dilute ammonia, before admission to the tower. The gas is therefore always saturated with water. and is free from mineral acid. The mixed gases are passed through the oxide till it is completely fouled, as shown by the free escape of H_2S at the outlet. The time occupied varies. In some

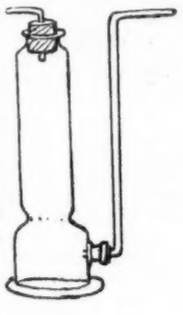


TABLE I.—*Natural Bog Ores.* / *Artificial Oxides.*

Nos.	1	2	3	4	5	6	7a	7b	8a	8b	9a	9b	10
Percentage of oxide of iron in oxide	19·3	46·22	43·35	48·84	41·25	21·01	23·0	23·0	28·8	28·8	35·5	30·5	35·66
Percentage of water	54·4	13·07	7·58	11·96	24·76	35·80	54·5	54·5	24·1	24·1	24·1	32·5	32·50
Five Foulings and Oxidations.													
Gain in weight, p.ct.	−3·7	28·7	34·2	98·7	19·2	−16·0	−3·7	10·5	−9·7	−3·8	9·4	−8	82·0
Percentage, water	10·4	—	—	—	—	—	10·46	—	3·8	7·9	—	—	—
,, sulphur	29·4	—	—	—	—	—	29·28	—	19·7	15·1	—	—	—
Ten Foulings and Oxidations.													
Gain in weight, p.ct.	28·0	12·5	9·0	21·8	19·9	18·4	27·0	15·6	10·1	8·5	31·2	22·0	14·5
Percentage, water	5·4	5·7	6·5	5·7	—	2·8	5·42	—	4·9	5·9	—	7·68	7·56
,, sulphur	47·6	33·2	25·7	53·6	—	33·2	47·66	—	24 2	28·6	—	31·50	46·33
Fifteen Foulings and Oxidations.													
Gain in weight, p.ct.	26·8	4·3	*Nil*	5·0	9·4	14·8	21·6	16·1	1·5	1·7	−4·3	23·0	12·85
Percentage, water	3·4	—	—	—	4·84	—	3·42	—	2·6	1·9	4·4	—	—
,, sulphur	57·7	—	—	—	44·80	—	57·72	—	25·8	34·4	38·4	—	—
Twenty Foulings and Oxidations.													
Gain in weight, p.ct.	*Nil*	4·1	1·6	5·6	7·0	14·2	*Nil*	4·8	4·7	3·0	5·9	14·0	4·6
Percentage, water	2·6	4·9	5·8	4·6	—	2·8	2·58	4·44	2 7	2·0	—	4·66	—
,, sulphur	59·5	38·1	27·3	58·3	—	47·7	59·46	62·12	27·8	35·9	—	48·92	—
Twenty-Five Foulings and Oxidations.													
Gain in weight, p.ct.	—	2·7	4·8	7·7	7·0	5·9	—	—	2·4	4·1	8·5	15·0	5·1
Percentage, water	—	—	—	—	4·24	—	—	—	4·2	2·8	4·3	—	—
,, sulphur	—	—	—	—	46·40	—	—	—	28·1	36·9	46·0	—	—
Thirty Foulings and Oxidations.													
Gain in weight, p.ct.	—	2·8	2·2	7·5	0·7	5·5	—	—	—	—	2·1	*Nil*	8·4
Percentage, water	—	4·5	5·8	4·2	4·22	3·1	—	—	—	—	3·9	2 38	5·36
,, sulphur	—	41·0	30·8	61·6	48·22	50·5	—	—	—	—	48·5	56·5	54·20
Total gain in weight, p.ct.	51·1	55·1	51·8	146·3	63·2	42·8	44·9	47·00	9·0	13·5	52·8	66·0	127·4
Sulphur absorbed per unit of oxide of iron in original oxide	4·6	1·37	1·08	3·1	1·9	3·4	3·7	3·97	1·0	1·4	2·1	3·1	3·4
	1·0	1·00	1·00	1·0	1·0	1·0	1·0	1·00	1·0	1·0	1·0	1·0	1·0
Weight of sulphur in final product per 100 grams of ore taken, grams.	89·9	63·6	46·7	151·7	78·7	72·1	86·1	91·3	30·6	41·8	74·1	93·8	123·3

NOTE.—Samples marked "b" were fouled at 100° Fahr.; all other samples at room temperature.

TABLE II.—*Results of Fouling and Oxidation of Various Oxides. The fouling in each case was with washed H_2S only, and was continued till the oxide was black and the H_2S passing freely. The oxide was then exposed to air, and the water and sulphur estimated.*

	Natural Bog Ores.					*Artificial Oxides.*		
Nos.	2	3	4	5	6	8	9	10
Percentage of oxide of iron in oxide	46·22	43·35	48·84	41·25	21·01	28·8	35·5	35·66
Percentage of water	13·07	7·58	11 96	24·76	35·80	24·1	24·1	32·50
Weight taken (grams)	10	10	10	50	50	50	50	50
Litres of H_2S required theoretically	1·9	1·8	2·0	9·8	4·39	5·0	7·4	7·5
= Litres used	1·2	1·8	3·0	4·5	4·00	1·25	2·0	12·5
= Grams sulphur	1·7	2·5	4·3	6·45	5·7	1·8	2·85	17·9
Time (minutes)	10	10	10	60	4·5 hours	10	10	2·25 hours
Weight of fouled oxide	10·35	10·5	11·2	49·7	43·9	38·0	43·2	59·7
Gain in weight, p.ct.	3·5	5·0	12·0	−0·6	−12·2	−24·0	−13·6	19·4
Percentage—Water	9·7	8·7	7·4	18·5	23·8	12·36	7·6	11·54
,, Sulphur	4·8	3·02	8·34	4·72	3·5	0·56	2·76	11·68
Weight of sulphur (grams)	0·497	0·317	0·93	2·34	1·536	0·21	1·19	6 97
Percentage of total sulphur absorbed in 30 foulings, taken up in one fouling	11·7	9·8	13·5	9·8	7·0	1·5	5·7	21·5
Percentage of sulphur in H_2S absorbed in one fouling	29·0	12·7	21·6	36·0	26·8	11·7	41·7	39·0

instances the oxide was completely fouled by one holder of gas in under one hour; in others, three to four holders of gas were used, and the time was four to six hours. With very active oxides, the flow of gas had to be carefully regulated to keep down the temperature. After fouling, the oxide was turned out on to a plate and exposed to air overnight, and the fouling repeated the next day. After five foulings and oxidations, the material was weighed, and the water and sulphur estimated in an average sample. I do not propose to recite the details given in the tables—you may study them with greater profit at your leisure—but will draw your attention to the final results.

In No. 1, Table I., a bog ore with 19·3 p.ct. of Fe_2O_3 and 54·4 p.ct. of water, 100 grams became 151·1 grams after 20 foulings, with 59·5 p.ct. of sulphur and 2·6 p.ct. of water, or a ratio of 4·6 parts of sulphur in the final product to 1 part of Fe_2O_3 in the original oxide. In the first five foulings, there was a loss of weight, and the water fell from 54·4 p.ct. to 10·4 p.ct., the sulphur content rising to 29·4 p.ct. In the second and third series of five foulings, there was a gain in weight and sulphur content. In the fourth series of five foulings, there was no appreciable gain in weight, and only a slight increase in the sulphur content. This bog ore was one of the best of any tested, and is one that is, I understand, giving satisfaction in practice.

Of the seven bog ores tested, it is to be noted that the three containing the least oxide of iron (Fe_2O_3)—*i.e.*, Nos. 1, 6, and 7—gave the best results, as judged by the ratio of sulphur to oxide of iron, and they all increased in weight by approximately 50 p.ct. Of the other four bog ores, with oxide of iron above 40 p.ct., the ratio of sulphur to oxide of iron in Nos. 2, 3, and 5, was less than 2 to 1, and the gain in weight approximately 50 p.ct. In No. 4, the ratio of sulphur to oxide of iron was 3·1 to 1, and the gain in weight 146 p.ct. This was undoubtedly the most efficient of the bog ores tested; 100 parts of the ore yielding 151·7 parts of sulphur. This table shows the great variation in the behaviour of these oxides—all bog ores. For every 100 parts of ore originally used, No. 3 gave 46·7 parts of sulphur; No. 1, 89·9 parts; and No. 4, 151·7 parts. Of the artificial oxides, No. 8 gave poor results, both as regards gain in weight and percentage of sulphur in the final product—ratio of sulphur to oxide of iron, and sulphur per 100 parts of oxide taken.

No. 10 gave excellent results—only excelled by one of the bog ores. No. 9a gave results equal to the average of bog ores; but No. 9b gave results only surpassed by one bog ore tested—*i.e.*, No. 1. No. 8 during the first five foulings was very active; the oxide heating and becoming black and brown on oxidation. After this, the oxide remained permanently black, and gained very little in weight and percentage of sulphur. The bog ores, Nos. 2 and 3, were very active, and became very hot. Change of colour was observable during the first eleven foulings and oxidations; after that, no change was apparent. No. 4 oxide was very active. During the first ten foulings and oxidations, gas had to be passed very slowly so as to avoid firing. No. 6 oxide was not a very active ore, and there was only very slight heating and change of colour in nine foulings and oxidations. No. 7 was very active, and got very hot during the first fouling, and for eighteen foulings and oxidations heated and changed colour. No. 9 oxide heated slightly, and change of colour was noticeable during thirteen foulings and oxidations. No. 10 oxide was the most active tested. During the first trials it got red-hot, and fractured the tower. The second trial fired on oxidation, and had to be repeated, and very careful fouling and oxidation was necessary.

It has been suggested that by one complete fouling with H_2S, the weight of sulphur absorbed would enable one to judge the relative value of various oxides. Table II. shows the results obtained in this way with some of the oxides tested in Table I. A comparison of the results obtained by one fouling and thirty foulings does not show any definite ratio. In No. 10, one of the artificial oxides, 21·5 p.ct. of the total sulphur absorbed was taken up in the first fouling; while in No. 8 only 1·3 p.ct. was absorbed in the first fouling. This table also gives the volume of H_2S theoretically required to convert all the Fe_2O_3 into sulphide, the volume of H_2S used, the weight of sulphur in the gas, time of fouling, and the weight as well as the percentage of sulphur in the fouled oxide. It will be noted that some of the oxides were fouled before the theoretical quantity of H_2S required was passed through; that in others, as Nos. 4 and 10, more than the theoretical quantity of H_2S was passed before complete fouling resulted; but in no instance was more than 40 p.ct. of the sulphur in the H_2S absorbed.

Table III. shows the results of a series of tests with No. 7 bog ore, using the same weight of oxide, but varying the volume of H_2S and the time of fouling. These results prove that the H_2S is rapidly absorbed at first. In the first experiment, 2 litres of H_2S were passed through in ten minutes, and 45 p.ct of sulphur in the H_2S was taken up. In the last experiment, 10 litres were passed through in 7·5 hours; and though the percentage of sulphur in the fouled oxide rose from 2·64 to 8·4 p.ct., only 26·5 p.ct. of the sulphur in the H_2S was taken up.

The results from Tables II. and III. are of interest as demonstrating the relative activities of the various oxides, as well as their relative capacity for absorbing H_2S.

TABLE III.—*No. 7 Bog Ore.*

Percentage of oxide of iron in oxide	23·0				
Percentage of water	54·5				
Test No.	1.	2.	3.	4.	5.
Weight taken, grams.	50	50	50	50	50
Litres of H_2S required to foul all the Fe_2O_3 to Fe_2S_3	4·8	4·8	4·8	4·8	4·8
(Theoretical) = Litres used	2·0	3·0	3·75	10·0	10·0
= Grams of sulphur	2·86	4·3	5·36	14·3	14·3
Time	10 min.	30 min.	4 hours.	7 hours.	7·5 hours.
Weight of fouled oxide	48·6	47·8	30·5	50·2	45·6
Gain in weight, p.ct.	−2·8	−4·4	−39	0·4	−8·8
Percentage, water.	50·34	49·00	20·8	43·1	40·9
,, sulphur	2·64	3·64	5·04	7·6	8·4
Weight of sulphur, grams	1·28	1·74	1·537	3·8	3·8
Percentage of total sulphur absorbed in 30 foulings, taken up in one fouling	4·2	5·8	8·1	12·2	13·5
Percentage of sulphur in H_2S absorbed in one fouling	45	40	28	26·5	26·5

Table IV. shows the results of a series of tests made with pure precipitated oxide of iron, in order to compare them with those obtained from natural bog ores and other artificial oxides, and also to determine the effect of the water of combination in the reaction.

A quantity of hydrated ferric oxide was prepared by precipitating ferric chloride with ammonia. The hydrate was washed free from ammonium chloride and allowed to air-dry till constant in weight. Four lots of 100 grams of air-dry hydrate were weighed out. No. 1 was fouled in the air-dry condition, No. 2 was fouled after drying at 100° C. till constant, No. 3 after drying at 150° C., and No. 4 after ignition at red heat.

A series of experiments was made with this oxide. After thirty foulings they all gave approximately 50 p.ct. of sulphur in the oxide. The results (confirmed by three trials) show that the ignited oxide took up sulphur as readily, even rather better than, the hydrated oxide. The sulphur absorbed per unit of Fe_2O_3, and the total weight of sulphur in the final product were also greater in the ignited oxide. This was confirmed by one fouling of this oxide (see Table V.), where, again, the weight of sulphur and the percentage of sulphur absorbed were greater in the ignited than in the hydrated oxide. In one of the series of tests with this precipitated oxide, the Fe_2O_3 was reduced by increasing the proportion of sawdust. This trial was made because it was generally found that the ore with the lower proportion of Fe_2O_3 gave the best results. The experiment showed, however, that diluting the oxide with more sawdust did not increase its fouling value relative to the oxide present.

TABLE IV.—*A series of fouling tests was made with precipitated oxide. Four lots, air-dried oxide, of 100 grams each, were taken.*

Test No.	1. (Air-dried).	2. (Dried at 100° C.).	3. (Dried at 150° C.).	4. Ignited.
Oxide of iron in oxide	56·5	56·5	56·5	56·5
Water	43·5	6·7	3·4	—
Weight	100·0	63·2	59·9	56·5
Corresponds approximately to	$Fe_2O_3 7H_2O$	$Fe_2O_3 H_2O$	$Fe_2O_3 H_2O$	$2Fe_2O_3 H_2O$

Each oxide was mixed with 25 grams air-dried sawdust. The weight of each prepared oxide before fouling was therefore:

Weight	125·0	88·2	84·9	81·5
Gases used: Coal gas 7. Sulphuretted hydrogen 2. Air 1.				
After thirty foulings and oxidations these became	167·9	160·8	178·2	209·6
Percentage, water	8·82	8·44	7·3	7·54
,, sulphur	48·60	50·16	48·0	47·04
Sulphur absorbed per unit of oxide of iron in original oxide	1·44	1·42	1·51	1·74
	1·00	1·00	1·00	1·00
Weight of sulphur in final product per 100 grams of oxide taken	81·6	80·6	85·5	98·5

TABLE V.—*Precipitated Oxide plus 25 p.ct. of Sawdust. One fouling with H_2S only.*

Test No.	1.	2.	3.	4.
Oxide of iron in oxide	56·5	56·5	56·5	56·5
Water	43·5	6·7	3·4	—
Weight taken	125	88·2	84·9	81·5
Litres H_2S theoretically required	24	24	24	24
Litres used	6 fully fouled, but 24 passed.	24	24	24
= sulphur, grams.	34·4	34·4	34·4	34·4
Time, hours	7	7	7	7
Weight of fouled oxide	129·5	99·2	96·9	97·5
Gain in weight	4·5	10·0	12·0	16·0
Percentage, water	18·9	9·18	9·28	5·16
,, sulphur	1·74	5·78	8·16	9·10
Weight of sulphur in grams.	2·27	5·73	7·90	8·87
Percentage of total sulphur absorbed in one fouling	6·6	16·6	23·0	25·7
Percentage of total sulphur absorbed in thirty foulings taken up in one fouling	3·6	11·4	16·4	18·8

These experiments were initiated to ascertain whether it was possible by laboratory methods to determine the value of an oxide. Incidentally they have shown:

1.—That if kept at a temperature of about 100° Fahr., better results are obtained than by fouling at ordinary atmospheric temperature.

2.—That hydration of the oxide is not essential, and that ignited oxides gave better results than hydrated oxide. The ignited oxides, however, always took up water to the extent of 5 to 8 p.ct., and water certainly keeps the oxide in a more suitable physical condition.

3.—That the percentage of Fe_2O_3 in the oxide is no criterion of its value for purification.

4.—That dilution of the oxide with sawdust, to expose a relatively greater area to the gas, did not increase the fouling value.

5.—That no definite conclusion can be arrived at from one fouling; but that after twenty to thirty foulings, a good oxide will contain 50 to 60 p.ct. of sulphur, it will increase in weight by more than 50 p.ct., and should yield 80 to 100 parts of sulphur for every 100 parts of oxide originally used, also that it should yield not less than three parts of sulphur to each part of Fe_2O_3 in the original oxide, and must not contain more than a definitely fixed proportion of water.

In placing these experimental results before you, I have not explained, nor attempted to explain, the differences obtained, but believe that if the experiments were continued with the pure precipitated oxide, under varying conditions of time, temperature, dilution of the oxide, ratio of flow of gas, introduction of an alkali (or other catalytic agents), we should learn much as to the most efficient kind of oxide to use.

My main object, as previously stated, was to attempt to devise a practical method of estimating the fouling value of an oxide and to put into the hands of gas engineers some data to enable them to compare one oxide with another, under similar conditions. More experimental work requires to be done before an attempt could be made to fix a definite standard which an oxide should pass, and further improvements in the procedure may enable one to reduce the number of foulings and time occupied in the tests. There are other factors which are known to affect the efficiency of the purification process, with which I have not attempted to deal, such as the capacity of the boxes, ratio of flow, the reversal of flow, &c.; but as removal of the H_2S is the primary object in using oxide, tests which indicate the oxide which can do this most efficiently, other conditions being equal, should be a decided advance to our knowledge.

Society of Chemical Industry.—The annual dinner of the Society will be held in the Connaught Rooms, Great Queen Street, on **Friday, Oct. 13.** Arrangements are being made to hold the annual meeting of the Society next year at Cambridge, in June.

THE RINCKER PROCESSES OF COMPLETE GASIFICATION AND CARBURATION.

By P. GREGORY.

[From a Paper read at the Annual General Meeting of the Société Technique du Gaz.]

In introducing his subject, the author prophesies that within a very short time the gas obtained by the complete gasification of coal without the introduction of inerts will be as important a factor to the gas industry as is water gas to-day. He divides his consideration of the matter into three main headings. First, what is the thermal value of the gas obtained? Secondly, what is the efficiency of its manufacture? And thirdly, given the legislative restrictions still placed on the sale of gas in France, to what extent can the gas be manufactured to be of service at the present time to the industry in that country, pending the arrival of an era of greater freedom?

PROPERTIES OF THE GAS OBTAINED.

The first question is discussed with much detail of the theory of combustion of gases, and illustrated by several complicated graphs, which need not be reproduced here. The author compares the "Rincker" gas with other gases from several points of view; and from the tables it is gathered that we have to deal with a gas of the following proximate analysis:

	P.Ct.		P.Ct.
CO_2	3·7	C_nH_m	0·9
CO	37·5	N_2	5·8
H_2	46·4	O_2	0·2
CH_4	5·5		

Its calorific value gross is 362 B.Th.U. per c.ft., and net 330. By comparison with a town gas of 600 B.Th.U. and a producer gas of 125 B.Th.U., the author shows that, theoretically at any rate, the "Rincker" gas is excellent from the thermal point of view. As regards lighting and heating, M. Gregory quotes Prof. R. V. Wheeler's communication to the Sheffield Gas Consumers' Association in March, 1921 [see "JOURNAL" for March 9, 1921, p. 615], in which it is shown that gas produced by the complete gasification of coal is very readily controlled and regulated. Moreover, he adds, experience in countries where there are no carbon monoxide restrictions has shown that it is perfectly suitable, even without the addition of coal gas, for lighting and all other domestic purposes—and, therefore, all the more so for industrial uses.

THE "RINCKER" PLANT.

The paper then proceeds to a description of the apparatus for the production of gas by complete gasification of coal, as invented by the Dutch Engineer Rincker. The nature of the apparatus can be seen from the accompanying sketch, fig. 1. It consists

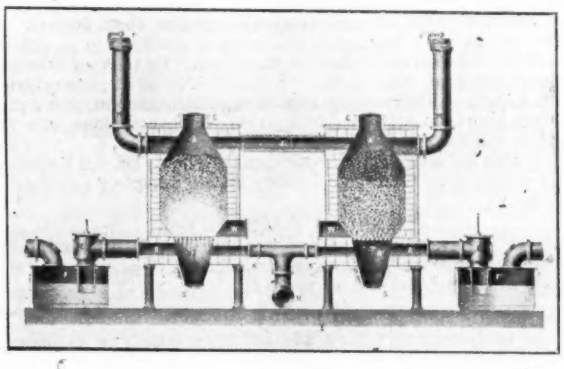


Fig. 1.—The Rincker Complete Gasification Plant.

essentially in the twin generators A and A^1, which serve alternately for the carbonization of coal and the gasification of the coke made. To explain the working method, the author starts at the conclusion of a period of coal carbonization in A; the generator A^1 having just received a new charge of coal. At this point the following are closed: The steam taps N and N^1, the valve for the "blow" air K^1, the gas outlet valve E, the waste product vent P^1, and the valve J on the connecting pipe. The vent P is open for the passage of the blow gases, the valve K for the admission of the air blow, and E^1 for the evacuation of the gas made. From this point onwards the cycle of operations begins with a blow period in the generator A, to raise the temperature of its coke charge to the required point; the air being introduced under pressure through the pipe H, and the blow gases passing out through P. Secondary air (inlet not shown in the sketch) is introduced to raise to a high temperature the top layer of coke and the refractory dome. If a sufficiently good steam supply is not available, the waste blow gases can be used for raising enough to work the plant. (The inventor has worked-out an ingenious arrangement). The change-over from blow to gas-making is then effected by closing the valve K, the secondary-air valve, and the lid P. The connecting valve J

is opened, and the steam admitted at N. During the gas-making period, the water gas formed in A passes by the communication pipe into A^1. By virtue of its sensible heat, it begins the distillation of the coal in A^1; and, carrying with it the products of carbonization, it passes from top to bottom through the bed of incandescent coke which is left in the lower half of the generator when the coal charge is introduced. The heavy hydrocarbons are decomposed, and the gas passes through R^1 into the hydraulic main F^1. Only traces of tar are deposited here before the gas goes to the condensing and washing apparatus. As soon as the temperature of the coke in A is no longer sufficient for the satisfactory manufacture of water gas, the steam is shut off at N, the valve J is closed, and K and P re-opened. Thus the starting position is resumed, except that the coal in A^1 is partially carbonized. The operations described are carried on in the same way until the carbonization is complete. This done, a charge of coal is introduced by the mouth C into A, to replace that portion of the coke which has been gasified, and the valve E is opened, and E^1 closed. In this way the initial situation exists once more, but with the functions of A and A^1 reversed. Clinkering takes place in the usual manner once every twenty-four hours, by means of the openings at W and W^1, and the lids S and S^1. A variation of the apparatus consists in the connecting pipe being at the lower ends of the generators, the steam injection and gas outlets being at the top. This arrangement is interesting in certain cases as permitting of the recovery of the condensable products.

The Gas-Making Efficiency.

In working-out the efficiency of the process, let

P be the calorific value of the coal used,
C the weight of total carbon per kg. of coal,
Cv the weight of volatile carbon per kg. of coal,
r the efficiency of manufacture of the water gas produced,
R the total efficiency of gasification.

Part of the volatile carbon will be deposited on the incandescent coke. If Cv_2 represents the quantity remaining in the volatile state, then $C - Cv_2$ will be the weight of the carbon serving for the production of water gas, and the corresponding consumption of calories will be

$$8080\ (C - Cv_2) \times (1 - r).$$

The traces of tar deposited in the hydraulic main and the scrubbers being negligible, the balance of the calories contained in the coal, viz.:

$$P - 8080\ (C - Cv_2)\ (1 - r)$$

will be found in the mixed gas made. The gasification efficiency R will therefore be given by

$$R = 1 - \frac{8080\ (C - Cv_2)\ (1 - r)}{P}$$

from which

$$\frac{1 - r}{1 - R} = \frac{P}{8080\ (C - Cv_2)}$$

This proportion of the losses in the case of water gas to those of the integral gasification will always be greater than unity, since the calorific value of coal is always greater than 8080.C. In other words, the efficiency of the integral gasification is greater than that of the manufacture of water gas. To take an example, assume the coal used to have a calorific value of 7800 calories, with 60 p.ct. of fixed carbon, 20 p.ct. of volatile carbon, and 4 p.ct. of free hydrogen after deducting that which combines with the oxygen and the nitrogen. Then P = 7800 calories, C = 0·80 kg., Cv = 0·20 kg., and the free hydrogen, h, = 0·04 kg. If the efficiency r is 64 p.ct., then the efficiency of the complete gasification will be

$$R = (70{\cdot}2 + 37{\cdot}3\ Cv_2)\ \text{p.ct.}$$

That is to say, in a normal case, where 50 p.ct. of the volatile carbon is transferred to the gas—*i.e.*, where Cv_2 = 0·10—the efficiency of the process will be 73·9 p.ct.

Utility of the Process.

The usefulness of such a gas for town supply is at present limited, at all events as far as France is concerned, by the restrictions on carbon monoxide. It can, therefore, only be regarded in the same light as water gas; that is to say for admixture with ordinary coal gas, either to improve the thermal efficiency, or to give elasticity to available supplies. Naturally the choice between water gas and the complete gasification process must rest to a large extent upon their respective costs. Labour and upkeep charges, and the volumetric yields of gas being about equal in the two cases, the difference revolves largely upon the costs of the raw materials used—coal and coke. But if the thermal efficiencies of the two processes, and not only gas volumes, are taken into consideration, the balance, from the point of view of raw materials, is in favour of the complete gasification process, inasmuch as the price of coke will not be less than about 85 p.ct. of that of coal. It must be remembered, of course, that the complete gasification plant will cost more than a simple blue water-gas installation. On the other hand, it will give to the gas-works which possesses it a much greater elasticity of production, in that a normal coal gas can receive an admixture up to 37 p.ct. of its own volume of the new gas (with 34 p.ct. of CO) without exceeding the permissible limit (French) of CO; whereas with water gas 27 p.ct. is about the maximum. All calculations, in fact, in connection with the two systems, can be easily enough made in each individual case, with the exception of the important one of the prices of coal and coke, which are essentially variable quantities. Thus, it may pay the gas undertaking at one time to adopt one process, at another the other, and even to vary between blue and carburetted water gas. An apparatus to meet all three cases can be realized by a simple adaptation of a carburetted water-gas plant which has been patented by Rincker, embodying new processes of carburation on a column of coke raised to suitable temperatures, which he has worked-out in collaboration with another engineer—M. Wolter. It is intended at the same time to make possible the use, hitherto impossible, of fairly cheap carburetting material, such as heavy oils, mazouts, tar, &c.

The Rincker-Wolter C.W.G. Process.

The carburetted water-gas apparatus is shown in fig. 2. For purposes of description, it is assumed to be working normally, and at the beginning of a blow period in the generator A there are closed the steam taps N and N^1, the taps B and B^1, the air valves K^1 and L^1, the lid P, and the valves E and E^1. The primary-air valve K, the secondary-air valve L, and the lid P^1 (through which pass the blow gases) are open. During the blow period, the primary air is introduced under pressure at K, and by admitting secondary air at L the carbon monoxide formed is burned. The combustion gases pass through the pipe D into A^1, give up some of their heat to the coke, and pass out through M^1 and P^1. The gas making starts as soon as the requisite temperature is attained. K, L, and P^1 are closed, and the valve E^1 for

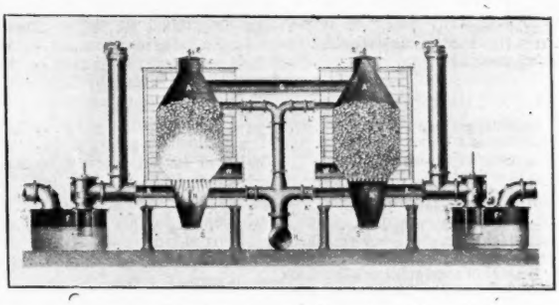


Fig. 2.—The Rincker-Wolter C.W.G. Plant.

the evacuation of the gas is opened. Steam is admitted at N, and the carburetting material at B^1. Water gas is formed in A, and its carburation takes place during its passage through the incandescent coke in A^1. The carburetted gas then leaves the apparatus by R^1, and so passes through the hydraulic main F^1 to the condensers and scrubbers. After five or six minutes the carburettor B^1 is closed, and then the steam cock and the valve E^1. The cycle of operation is then restarted, either with a new blow of the generator A, or by reversing the functions of the two, according to what temperatures are most suited to the particular carburant used, or to the degree of carburation required.

The Rincker "Universal" apparatus, for making blue or carburetted water gas, or for complete gasification, is a simple combination of the two types of plant illustrated and described above; the only addition to the apparatus shown in fig. 2 being horizontal pipes connecting the vaulted tops of A and A^1 with the vertical flues P and P^1 respectively.

The paper contains graphs and tables showing in considerable detail the working of the carburetting process, its efficiency and results with various carburants, &c. It is interesting to note that tar can be used, and a percentage analysis of a gas carburetted with tar of 1·08 density is given as: C_nH_m, 4·1; CH_4, 14·1; CO, 25·8; H_2, 47·1; CO_2, N_2, O_2, 8·9; with a calorific value of 4480 calories [500 B.Th.U. per c.ft.].

Shop Window Lighting.

Many of the leading shopkeepers now leave their windows fully lighted up to a late hour every evening, even though the shop may be closed for business. This means of advertising has been the subject of very favourable comment of late in business circles and in the Press; and it is difficult to find any sound argument against it. For the comparatively small cost represented by the window lighting bill, the salesmanship value is considerable. Especially is this the case as regards shops which close at a rather early hour; for the system enables the shopkeeper to show his goods under attractive conditions to many potential customers who are at business during the daytime, and whose opportunities of seeing what is on sale are limited mainly to hours after six o'clock in the evening. Such customers do the bulk of their shopping by post or by proxy; and it is only by properly lighted window displays that their attention and custom can be caught. The current number of "A Thousand-and-One Uses for Gas" (No. 102) contains a series of photographs of shops and shopping parades brilliantly lighted by low and high pressure gas-lamps, and contains a wealth of useful advice as to the latest and most efficient types of lamps, burners, reflectors, and shades for shop lighting. Every shopkeeper who is at present dissatisfied with his existing system, or whose lighting tends to be "eclipsed" by that of his neighbouring competitors, should write for this thoroughly practical little magazine, which will be sent (6d. post free) on application to the Secretary, British Commercial Gas Association, No. 30, Grosvenor Gardens, S.W. 1.

LOW-TEMPERATURE CARBONIZATION AND THE THERM.

By WALTER CHANEY.

THE gradual development of the gas industry has been marked by the increased temperature employed in the carbonization of coal with a view of obtaining a larger yield of gas in cubic feet—a development prejudicial both to the quality of the coke and the production of tar.

The sale of gas by the therm instead of by cubic feet no longer necessitates the increased temperature of carbonization necessary for the secondary decomposition to produce a large yield in cubic feet. On the contrary, in the multiplication of the quality by the quantity to form the therm, the quality is the predominating factor.

The registration of gas is still based upon the volume passed through the consumer's meter; and it is therefore obvious that the yield in therms is financially more advantageous the higher the declared calorific value, as indicated in the appended table.

C.Ft.		B.Th.U.		Therms.				
1000	of	475	=	4·75	(say)	at 8d. per therm	=	38d.
1000	,,	500	=	5·00	,,	,, ,,	=	40d.
1000	,,	600	=	6·00	,,	,, ,,	=	48d.
1000	,,	700	=	7·00	,,	,, ,,	=	56d.
1000	,,	1000	=	10·00	,,	,, ,,	=	80d.

The report of the Fuel Research Board, 1920-1921, states that the ideal aim in the carbonization of coal is the production of the maximum percentage of therms in the coal in the shape of a saleable gas, and draws attention to the rich hydrocarbon gas of low-temperature carbonization, the importance of which has not yet been realized.

The calorific value of this gas is about 1000 B.Th.U. per cubic foot. The widest and most natural outlet would be as an enriching agent for the raising of low-grade gas to a higher calorific value.

The statement published in the "GAS JOURNAL" for Feb. 22 last, showing the working results of seven of the Metropolitan and Suburban Gas Companies, would probably help in considering the value of low temperature gas for raising the calorific value of the town supply. This statement (which was compiled by Mr. F. J. Bradfield, the Secretary of the Commercial Gas Company) includes the declared calorific value, the net cost of manufacture per therm, and the percentage of carburetted water gas made. With the help of his figures, the following data are compiled:

—	B.Th.U.	Therms per 1000 C.Ft.	P.Ct. of Water Gas Made.	Gas Made per Ton. Therms.	C.Ft. per Ton.	Gas into Holder. Pence per 1000 C.Ft.	Gas into Holder. Pence per Therm
South Metropolitan .	550	5·50	*Nil*	69·91	12,711	34·72	6·31
Gas Light and Coke .	475	4·75	33·02	63·53	12,194	39·49	8·31
Commercial . . .	475	4·75	30·05	66·44	12,696	38·65	8·14
Wandsworth . . .	470	4·70	21·57	63·28	13,073	43·82	9·32
Tottenham	450	4·50	28·72	65·33	13,433	45·78	10·17
Brentford	460	4·60	49·81	..	11,146	46·14	10·03
South Suburban . .	460	4·60	29·15	65·57	12,058	43·02	9·35
Low-temp. gas. . .	1000	10·00	..	30·00	3,000	40·00	4·00
Blue water gas. . .	300	3·00	..	..	..	12·00	4·00

Blue water gas is the lowest grade of gas forming a town's supply; and to raise its calorific value to (say) a declared value of 480 B.Th.U. per cubic foot would necessitate the addition of

25·7 p.c. of low-temperature gas of 1000 B.Th.U. per c.ft.
74·3 ,, ,, blue water gas ,, 300 ,, ,,

100·0 c.ft. of town gas of 480 B.Th.U. per cubic foot.

Assuming the cost of blue water gas at the present time to be 4d. per therm into the holder, and accepting the valuation of the Fuel Research Board of 4d. per therm for low-temperature gas, then a town supply of blue water gas and low-temperature gas of 480 B.Th.U. per cubic foot would cost 4d. per therm into the holder.

Again, assuming that 65·4 therms (12,800 c.ft. of 511 B.Th.U. gas) may be produced by ordinary carbonizing plant, then a town's supply of 460 B.Th.U. based upon the declared value of the Brentford Company would be as follows:

Coal gas	12,800 c.ft. of	511 B.Th.U.	=	42·9 p.ct.
Blue water gas . .	14,050 ,,	300 ,,	=	47·2 ,,
Low-temp. gas . .	2,950 ,,	1000 ,,	=	9·9 ,,

29,800 c.ft. of 460 B.Th.U. = town gas.

Based upon the Brentford figure, the cost of the therm would then be as follows:

Coal gas	42·9 p.ct. of	10·03d.	= 4·30d.
Blue water gas	47·2 ,,	4·00	= 1·89 ,,
Low-temp. gas	9·9 ,,	4·00	= 0·39

Cost per therm of 460 B.Th.U. town gas into holder = 6·58d.

Or again, dealing with the high yield of gas obtained by Sir George Beilby by means of steaming in vertical retorts (*vide* "Transactions of the Institution of Gas Engineers," 1920-1921)—by this method Sir George obtained a yield of 110·8 therms per ton of coal; the calorific value of the gas being 432 B.Th.U. per cubic foot. An addition of 8·5 p.ct. of low-temperature gas would have raised this low-grade gas into a town supply of 480 B.Th.U.

The best results obtained by the Metropolitan and Suburban Companies were those of the South Metropolitan, who produced 69·91 therms per ton of coal carbonized; the net cost of manufacture being 6·31d. per therm. It may be therefore assumed that the extra yield obtained by Sir George Beilby would have resulted in the net cost of manufacture being reduced to about 4d. per therm. Therefore:

91·5 p.ct. of	432 B.Th.U. gas at	4d. per therm	=	3·66d.
8·5 p.ct. ,,	1000 ,,	,, ,,	=	0·34d.
Cost per therm of 480 B.Th.U. town gas . .			=	4·00d.

No extra demand is made upon the quantity of the coal required for carbonizing purposes. On the contrary, the intrinsic value of the low-temperature gas for enriching purposes results in a considerable saving of coal.

Again Sir George Beilby's figures:

25,610 c.ft. of	432 B.Th.U. gas	=	110·8 therms	=	1·00 ton.
2,380 ,,	1000 ,,	=	23·8 ,,	=	0·79 ,,
27·990			134·6 ,,	=	1·79 ton.

= 75 therms per ton of coal.

The Gas Light and Coke Company produced 63·53 therms and the South Metropolitan Gas Company 69·91 therms—resulting, in the former case, in a saving of 18 p.ct. in the total tonnage of coal used.

Apart from the question of the use of gas as an enriching agent, undoubtedly the most important aspect of low-temperature carbonization is the production of oil from coal. Gas undertakings are large buyers of sea-borne oil; but it is imperative from a naval and industrial point of view that we produce our own oil in our own country. In this connection it has been freely stated that we were within an ace of losing the war because of the oil and petrol shortage, and it is said that at one time only seven days' supply separated us from disaster. The oil we require is in our own coal, and gas undertakings are favourably placed to become purveyors, instead of buyers, of that commodity; and not only favourably placed as purveyors, but as distributors throughout the country.

There is no question as to the loyalty and sacrifices made by gas undertakings during the war. But the necessity of producing the oils in this country is still essential; and it is clearly the duty of the Government to render the production of home-made oil almost as secure as the manufacture of other munitions of war.

CATALYTIC CRACKING OF HEAVY PETROLEUM OILS.

By. P. MALLET.

[A Paper read at the Annual General Meeting of the Société Technique du Gaz.]

Ever since the distribution of blue water gas has been practised, gas undertakings have been compelled, owing to its poverty in illuminating and calorific power, to enrich it by some means or other; and the method usually adopted has been to mix with it the products of the pyrogenation of heavy petroleum oils. In France, quite apart from the prohibition on the distribution of water gas at all—only quite recently rescinded—the manufacture of rich gas from petroleum oils has always been commercially impossible owing to the prohibitive customs tariff. With the sale of water gas now permissible, and its manufacture coming into general practice, the customs duty on heavy petroleum oils has also been enormously reduced under certain conditions, being now less than one-twentieth of the former rate. To come under the new rate, however, gas-oil must not distil more than 20 p.ct. at temperatures below 275° C.; so that the regulations do not go far to meet the gas industry. In any case, it has been questionable for some time whether the crude methods of cracking which have been in general use for many years could not be replaced by some process more scientific and economical. The ordinary methods are, in effect, partially destructive; at the temperature at which they are worked part of the material treated must resolve itself into the two ultimate terms of the decomposition at high temperatures of hydrocarbons—hydrogen and carbon.

The problem has been investigated by two eminent scientists in M. Sabatier, of Toulouse, and Prof. Mailhe. It is with the results of their research, and their practical application to gas manufacture by M. Léon Blanchet, that the author deals in his paper. Guided by their exceptional knowledge of catalytic phenomena, they established the fact that copper, in the pulverulent state, has the property of assisting towards the object in view; that is to say, to obtaining at moderate temperatures a large quantity of rich gas, without dissociation of the material treated. The copper is amalgamated with magnesium to make it more permeable. The influence of the copper is twofold. In the first place it serves to distribute the heat, as would any other metal; and it also acts as a specific agent. If the heat-distributing metals were iron, nickel, or cobalt, considerable deposits of coke would be produced. So the originators of the present process cover the interior of their

retort with a coating of copper, so that there is found on the surface only a very light deposit of soft non-adhesive carbon; whereas, if the retort were left plain, it would become covered with hard carbon.

In the treatment by this method of heavy petroleum oils of specific gravity 0·85 to 0·87, of calorific value 10,900 calories [19,650 B.Th.U. per lb.], at a maximum temperature of 600° C., 1000 kg. of oil would yield 420 cub.m. of gas of density 1·00 to 1·20 and mean calorific value 15,000 calories; 275 litres of motor spirit, and 184 kg. of tar. [This means that a ton of the oil yields 15,070 c.ft. of gas of calorific value 1686 B.Th.U. per c.ft.; 62 gallons of motor spirit; and 410 lbs. of tar.] With the tar is mixed a certain quantity of undecomposed gas-oil, which is not surprising, since an integral catalysis can only be effected by having catalyzers of inordinate length. The mixture of oil and tar is submitted to distillation, as the oil cannot re-enter the cycle of the operation until separated from the tar. The latter is of excellent quality. The light hydrocarbons obtained either by simple condensation or by washing the gas have not been investigated yet. They appear from casual examination to contain a large proportion of olefines (hydrocarbons of the ethylene series). In any case it matters little, as they contain practically no sulphur, and have proved eminently suitable for motor fuel.

The process in question has not as yet been tried on a very large scale; but it has been worked in England, and has had a four months' trial at the Forest works in Brussels of the Compagnie Continentale du Gaz. The Company is so satisfied that it contemplates extending the Forest plant, and also adopting the process at some of its other Belgian works. Without the catalytic action, the gas produced at such low temperatures would be far less in quantity; and, on the other hand, if higher temperatures were used to increase the gas make, the value of the total products recovered would not be so great. This the author illustrates by comparison with the results obtained by some of the American petroleum refineries, and his points are amply proved by the figures he gives. The commercial importance of the process will, he maintains, only be established by working it over a long period on a large scale. There are certain complications which have to be considered and weighed-up, not the least of which is that the recovery of hydrocarbons, inevitable at the temperatures used, involves rectification, of however simple a nature. For those who extract their benzole and distil their tar, this will not be a great undertaking. And will not many of them, he asks, be coming to this before very long?

Appended to the paper is a description, by Prof. Mailhe, one of the inventors, which briefly shows the chemical and technical details of the process.

The higher hydrocarbons, with boiling-points above 300° C., begin to suffer decomposition even when distilled at ordinary pressure. But it is very little noticeable. It is, however, considerably assisted by the addition of a catalyzer heated to 500° or 600° C. The presence of a metal such as copper regularizes the decomposition, and effects a dissociation of the heavy hydrocarbons of petroleum into more simple ones, down to the first term, which is methane. In this way a mixture of saturated and non-saturated hydrocarbons is obtained, some gaseous up to the fourth term, others in easily condensable liquid form, possibly up to the eighth term and even a little further. The gases are always accompanied by a certain proportion of hydrogen. The following reactions indicate the decomposition which takes place:

$$C^nH^{2n+2} = C^pH^{2p+2} + C^{p'}H^{2p'+2} + \ldots\ldots$$
$$C^nH^{2n+2} = C^pH^{2p} + 2H_2 + C^{p'}H^{2p'} + \ldots\ldots$$
$$p + p' + p'' \ldots\ldots \text{finally} = n$$
$$p, p', p'' \ldots\ldots \text{will have every value from unity to a number always less than n.}$$

Thus the catalytic dissociation produces gases including hydrogen, methane, ethane and ethylene, propane and propylene, butane and butylene, and even amylene boiling at about 35° C. These, of course, are rich gases and vapours, and their calorific value is in the neighbourhood of 15,000 cal. to the cub.m. [1686 B.Th.U. per c.ft.]. The liquid portions boiling between 40° and 180° C., for instance, will be formenic hydrocarbons mixed with olefines, from the fifth term (pentanes and pentenes) to the C^8 or C^9 term.

The proportion of the ethylenes is considerable—about 40 p.ct. Their removal by sulphuric acid treatment could not be considered. They constitute an excellent carburetting medium in the same way as the formenic hydrocarbons of natural petroleum spirit. Their mixture with the saturated components has given excellent results in internal combustion motors. It might be objected that these unsaturated carbons are oxidizable. But their oxidation takes place only after a long period, and this is not a serious objection.

The practical application of this theory consists in passing the fumes of heavy petroleum oils across a catalyzer at a suitable temperature, situated in tubes or retorts, condensing at the outlet the liquid products transformed or otherwise, and collecting the uncondensable gases in a holder. The condensed liquid products are then rectified to remove the most volatile portion—up to 180° C.—and the residue is again passed over the catalyzer for complete conversion.

City and Guilds of London Institute.—The offices of the Department of Technology have been removed to No. 29, Roland Gardens, Old Brompton Road, South Kensington, S.W. 7.

COAL AND COAL WORKING.

By T. G. DOBB, General Superintendent of the Wigan Company's Collieries.

[A few short notes on the formation and working of coal, prepared for the visit of the members of the Manchester and District Junior Gas Association to the Wigan Coal and Iron Company, Ltd., Sovereign Pits, Westleigh, on Sept. 6.]

COAL: ITS FORMATION.

It is universally accepted that coal is the mineralized remains of vegetable matter—plants and trees—the growth of a former age. Coal is found in more or less parallel layers known as beds or seams, separated from each other by beds of shale, clay, sandstone, and other stratification. Certain theories are advanced as to the laying-down of these beds; but it is generally assumed that this vegetation formerly flourished in low-lying swamps and flood plains, and was, owing to the subsidence of the earth's crust, afterwards buried beneath the beds of clay, shale, and sandstone deposited by the water covering the vegetation. Afterwards elevation of the subsidence seems to have occurred, and suitable conditions for plant growth again prevailed after the shales and sand had been deposited. With the coal seams and other measures lying one above the other, it is seen that the process must have been repeated time after time.

The covering of the vegetation by these other mineral deposits would protect it from the air, besides subjecting it to the action of heat and pressure. The combined action of heat and pressure and time would gradually produce a change in the physical appearance and chemical composition, and slowly convert it into the many varieties of coal which now exist. Chronologically, the formation of the coal seams is as follows: Vegetation, peat, lignite or brown coal, bituminous coal, and anthracite.

Confining ourselves to the coals of the bituminous class, these include the caking and non-caking varieties, which in turn may be sub-divided according to the use the particular coal is put to—such as house, gas, and steam coal. The Arley Mine of our local coalfield forms one of the caking variety, and is used extensively both as a gas-producing and house coal. To refer to the colliery to which the visit is intended, the Westleigh Sovereign Arley Mine (situate at a depth of 660 yards below the surface) is a mine of this class.

WORKING OF COAL SEAMS.

To locate the coal seam in an unknown area, a preliminary examination of the surface, together with geological information, is necessary, in order to find out whether coal is likely to be present or not. After careful prospecting, and before commencing to sink a shaft, it is often necessary to prove the exact depth, thickness, and inclination of the seams, and nature of the underlying strata. This information is obtained by boring, at certain points in the area, holes a few inches in diameter from the surface through the strata to the coal seams. This boring is accomplished generally by machinery giving a rotary action to a circular hollow drill, which enables a core to be obtained of the strata penetrated, and may go to any depth up to 3000 or 4000 ft.

After locating the coal, the site of the shafts must be decided. The shafts generally are circular in shape, sunk vertically and brick lined; any variation from the latter being due to percolation of water, and bad stratifications requiring stronger linings. The size of the shaft depends chiefly on the proposed output per day, and may vary from (say) 10 to 24 ft. in diameter. The size of the shaft to the mine already referred to is 20 ft. in diameter. For ventilation purposes, two shafts are sunk, one termed the downcast and the other the upcast, to which a connection is made to an exhausting ventilating fan.

WORKING.

As will, no doubt, be understood, seams of coal vary widely in character, thickness, degree of hardness, and various other particulars known to the miner.

It can be said that no one method has ever been fixed upon for all mines; but the two main systems are "pillar and stall," and "longwall." Generally speaking, the pillar and stall method is used in seams from 7 ft. in thickness and upwards. By this system of working, the seam is split-up into pillars or panels, which may be either square or rectangular. The main or haulage roads are driven out to the boundaries of the workable area. Other roads at right angles and parallel to the main headings are driven to form the splitting-up into pillars. The pillars are worked-out at a later period.

The longwall method of working is usually adopted where the seams are under 7 ft. in thickness. The thickness of the seam is not the only consideration; the roof and floor, proximity of the seam to the surface, and the support of surface buildings, must also be considered. In this system the coal is extracted in one operation. The main roads are driven-out from the shaft and split the area to be worked into districts of one size, so as to permit an equal output as near as possible from each district. The haulage road advances as the face advances, one or more straight faces being formed. Branch roads are driven off the haulage roads to the various points of the face, forming a network of roads, which are cut-off by cross roads; and fresh roads are started as the face advances. The coal is got by undercutting from any-

thing up to 5 ft. deep. This is done either by hand or machinery. The latter, which is a more modern method, is extending in use year by year.

A certain part of the Arley Mine, which it is proposed to visit, is worked by this method. Props, bars, and square stacks of timber, set at specified distances apart, form the support of the roof on the coal-face. Steel props are also sometimes adopted as supports. Props and bars of a larger diameter, steel girders, and arches form the support of the haulage roads and branch roads. The roof taken down to obtain the height in these roads is packed away in the waste afforded by the extraction of the coal.

The coal is conveyed from the face to the haulage road, to the pit bottom, and thence to the surface, in wooden or steel tubs, of a capacity of about 8 cwt. The main haulage is in practically every case carried out by mechanical power—electrical, steam, or compressed air—the engines being placed either on the surface or underground. Electrical power being more economical and efficient, is now extensively used in modern collieries. The systems of haulage vary according to the conditions of the mine. The over-rope method of endless rope haulage is chiefly used in Lancashire, with a rope speed of from 1 to 3 miles per hour.

Raising Coal to the Surface.

The headgear, winding engine, and winding drum are essentials necessary to raise the coal to the surface. The headgear may consist either of pitch-pine or steel framework. The engines may either be electrically or steam driven, the latter being the chief motive power at present in use in this country. The engines are fitted with efficient brakes to hold the cages at any point in the shaft. Safety appliances to help to prevent over-winding are attached to the engines; and, in addition to these, appliances are fixed in the headgear to catch the cages in case of over-winding. The winding drum, commonly of the cylindrical type, is built-up of steel. The rope coils round the drum, and passes over the headgear pulleys to the centre of the cage and cage attachments.

The following particulars of the winding plant at the Sovereign Pit may be of interest:

Type of engine	Horizontal.
Diameter of cylinders	40 in.
Stroke	7 ft.
Indicated horse-power	1800
Diameter of cylindrical drum	22 ft.
Diameter of rope	1⅜ in.
Steam pressure	80 lbs. per sq. in.

Banking and Screening.

The proper laying-out of the surface arrangement at a colliery is very important. The extent of the plant, of course, is largely influenced by the tonnage to be raised daily. The coal having been brought to the pit bank either is hauled or gravitates from the shaft to the weighing machine, afterwards running into tipplers, where the coal is mechanically tipped from the tubs on to the screens. The empty tubs from the tipplers are generally run by gravity to a creeper chain, by means of which they are raised to the requisite height to permit their running back to the empty side of the pit.

The screening plant consists of a shaker or jigging screen, the coal being generally assorted into four sizes — slack, nuts, cobbles, and round coal. It is then delivered on to picking belts, alongside which women and youths pick-out the dirt and unsuitable coal (perhaps not always to the satisfaction of the customer), and then passes on into the wagon, and so to the customer.

No British Coal for Berlin Gas-Works.—According to a Reuter telegram from Berlin on Friday last, it was announced that, owing to the further depreciation of the mark, the Berlin Gas-Works would discontinue purchasing coal in Great Britain, and would endeavour to secure supplies from Polish Silesia.

British Gas Light Company.—At the annual general meeting to be held on the 27th prox., the Directors propose to recommend, subject to audit, a final dividend on the ordinary shares for the year ended June 30 last at the rate of 5 p.ct. (20s. per share), less income-tax, making 10 p.ct. for the year, also a bonus of 2s. 6d. per share, both payable on Oct. 6.

Broughton Gas.—The Manager of the Wrexham Gas Company (Mr. Evans) recently attended a meeting of the Broughton Parish Council and explained that his Directors were prepared to proceed with the laying of the gas-mains, and proposed to put in 1½ miles before the winter. It was decided that this be done, and that the thanks of the Council be given to Mr. Evans for the generous manner in which he had met them.

Increased Dividend at Morpeth.—The report of the Directors of the Morpeth Gas Light Company (1902), Ltd., presented to the shareholders at the annual meeting yesterday, showed a gross profit for the year of £3061, which, with £455 brought forward from last year, gave a sum of £3517 available. Dividends were declared at the rate of 5 p.ct. for the year on the preference shares, less income-tax, and of 6 p.ct., free of tax, for the year on the ordinary shares, and a balance of undivided profits of £682 was carried forward. The works and plant had been well maintained; a sum of £2564 having been spent in repairs and renewals during the year. The Directors congratulated the shareholders upon the very gratifying results of the twelve months' working, which had been largely due to increased sales of gas, accompanied by economies in manufacture and a larger output per ton of coal carbonized. This had enabled a substantial reduction to be made in the price of gas. The Directors felt justified in recommending a slightly increased rate of dividend after making very adequate provision for the reserve accounts of the Company.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Gas Therm.

SIR,—The principle of charging for gas on the basis of heat content is ethically sound and admittedly correct; but, bearing in mind the susceptibility of gas consumers—a quality only appreciated by those dealing with them day by day—the method of application, though well-intentioned, is a mistake. Theorists, therms, thinking machines, and the rest of it, are nursing (or crushing) the life out of the industry (as we thought they would) through general difficulty, added expense, Press campaigns of obliquity, and other costly things. Thus the Gas Regulation Act *was* as welcome piece of wreckage as ever came the way of a drowning mariner.

The Board of Trade unit of electricity, containing as it does a given number of British thermal units, such consumers are really buying on the "heat-unit" basis. Similarly, were our cubic foot standardized to contain (say) 500 B.Th.U., we should sell by heat content though charging by volume—200 c.ft. and a therm would mean one and the same thing. Probably some undertakings would object to standardize; but I should think the majority would be glad to do so.

Let us put to our eletcrical friends this practical question: "What would be the result did one Board of Trade unit of electricity contain 3411 B.Th.U., another (say) 6822, and others again at anything at all within the range, your meters registering in units, and your bills being extended in watts?" I doubt, Mr. Editor, if the answer would be fit for publication in your columns.

OIKONOMIA.

Aug. 25, 1922.

Manufacture of Blue Water Gas in Conjunction with Coal Gas.

SIR,—With reference to the working results, &c., of my plant for the manufacture of blue water gas in conjunction with coal gas published in your issue of Aug. 9, I have now pleasure in informing you that the CO_2 content of the water gas has been reduced to 4 p.ct. as a result of reducing the periods of run and blow from 4½ minutes to 3 minutes.

With regard to Mr. Harald Nielsen's comments published on May 24, I think the information already sent to you, showing the water-gas generators as part of the bench of vertical retorts with charging plugs at the same level so that they may be fed with coke in the same manner as the producers of the verticals, shows that the advisibility of permitting no temperature drop in the water gas before its admission to the vertical retorts is appreciated by me.

J. LOWE, Engineer and Manager.

Auckland Gas Company, Ltd., Auckland, July 12, 1922.

REGISTER OF PATENTS.

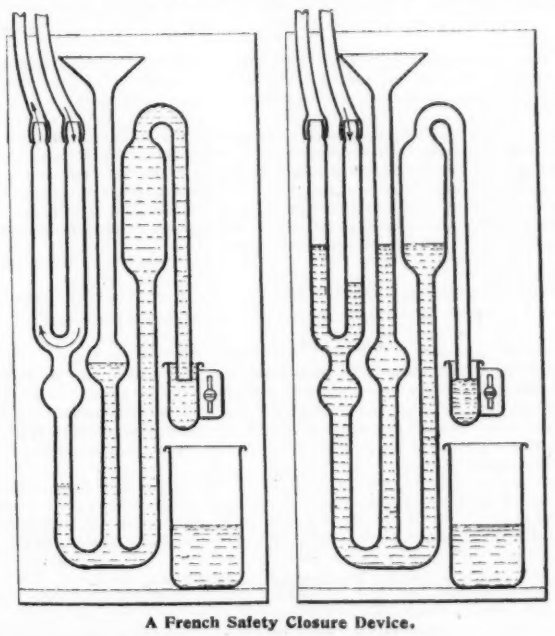
Syphon for Automatic Closure of Gas Piping.

No. 174,646.

CONTI, J. T. F., of Paris.

No. 2767; Jan. 30, 1922. Convention date, Jan. 31, 1921.

This invention relates to safety devices for gas piping systems. The apparatus is constituted by a U tube inserted in the system. At the base of this tube is placed another vertical tube provided with an



A French Safety Closure Device.

enlargement and communicating with a syphon. The ascending branch of the latter is also provided with an enlargement, while its descending branch dips at its inferior end in a cup. The position of

this cup may be vertically adjusted by means of a slide or by any other suitable arrangement. A fourth tube is connected in the manner shown on the drawings. This is provided with an enlargement and ends in a funnel shaped mouth. A vessel or other movable receiver is arranged to receive the liquid which overflows from the cup.

The operation of the system is evident from this description in connection with the drawings, which illustrate the normal and the "safety" conditions of the apparatus.

Prepayment Mechanism.—Nos. 183,156 and 183,157.

ANDERSON, J., of Edinburgh.

No. 2421; Jan. 18, 1921.
No. 2422; Jan. 18, 1921.
No. 6652; Feb. 28, 1921.

This invention relates to arrangements of price-changing and prepayment mechanism for coin-freed meters, particularly gas-meters, to which it is not limited. Patent No. 170,603 described price-changing mechanism having a perforated price-changing disc, a price-changing arm, and a curved slot for enabling a stop at the back of the arm to be engaged by the coin. Further, patent No. 170,813 related to certain arrangements of prepayment mechanism and measuring-out mechanism of the screw-and-nut type.

The main object of the present invention is to provide a modified or improved arrangement which consists in combined price-changing and prepayment mechanism for coin-freed meters, having the axes of the price-changing mechanism, of the measuring-out screw mechanism, and of the operating handle in line and running from front to back of the meter (parallel to the shaft of the index mechanism). The price-changing mechanism is of the kind comprising a perforated disc which partakes of part of the rotation of the coin pocket, an arm with a stop for engaging the perforations, and a stop for contacting with the coin. The measuring-out screw mechanism is substantially of the kind described in patent No. 170,813. The invention also consists in combined price-changing and prepayment mechanism, as described in detail in the specification.

The other specification describes an epicyclic gear measuring-out and indicating mechanism, such as is claimed to be very compact, enable a large movement to be secured in the register indicating the balance between coins inserted and gas consumed, and provide a fully-open gas valve after a short movement due to the insertion of a coin. This feature is of considerable importance in those cases where, as at the present time, a comparatively small quantity of gas is supplied for a penny.

The invention is based on the use of an epicyclic gear, of which several examples, however, have been proposed. So far as the patentee is aware, they differ from his arrangement in the manner in which the driving is effected, or do not provide such a compact construction, in part perhaps due to the particular arrangement of drive. The gear includes a crown-wheel with teeth projecting laterally from its periphery, and a pinion driven from the meter mechanism substantially in contact with the teeth of the crown-wheel; the two forming practically an enclosed cage containing a sun-wheel and planet-wheel. The crown-wheel carries a moving scale in the form of a circular annulus or disc which may be in the form of a dished plate partially enclosing the epicyclic gearing, and it also carries a cam or the like for effecting closing of the coin slot.

Retort Mouthpieces.—No. 183,225.

BURTON, A. E., of New Barking.

No. 11,134; April 16, 1921.

This invention relates to gas-retort mouthpieces with which self-sealing lids are employed, and particularly to such mouthpieces of the kind in which an accurately faced ring or flange of metal, adapted to make a tight joint with the lid when the latter is sealed, is secured to the mouthpiece in such manner that it can be readily removed and replaced.

This detachable flange is provided with peripheral extensions adapted to register with corresponding extensions (on the body of the mouthpiece) having openings for studs tightened by the use of wedge-shaped cotter pins, or in other suitable manner. The flange may be arranged to carry the lugs which receive respectively the eccentric hinge and the locking device for the crossbar of the lid, so that the flange and lid may be removed together to a convenient place for re-facing and adjustment; or it may be arranged to fit between the existing lugs on the mouthpiece which receive the crossbar, so that the flange can be separately removed and replaced. The flange can readily be made gas-tight by the use of cement or the like.

Interconnected Cocks for Geysers.—No. 183,291.

BEARD, P. G., & C. S., both of Northampton Square, E.C.

No. 13,247; May 10, 1921.

This invention relates to interconnected gas and water cocks for geysers and the like water heaters arranged so as to render it impossible to turn on the gas supply without first having turned on the water, or to turn off the water until the gas supply is completely shut off, and wherein a pilot jet is carried over or away from the burner on the gas outlet pipe.

To the spindle of the water cock is secured a circular plate, which has a tooth or projection which engages a recess in a plate on the gas-valve stem. The latter plate has circular concavities to accommodate the circular periphery of the toothed plate on the water cock.

Crucible Furnaces.—No. 183,394.

TEISEN, T., of Moseley.

No. 30,605; Nov. 16, 1921.

This invention relates to gas-heated crucible furnaces, particularly those employed for melting glass or metals. In some form of furnaces gas is delivered to a heating chamber through a vertical burner passage into which air also is admitted through radial passages. Owing to the high temperatures produced at and near the confluence of the gas and air streams, the inner suface of the burner passage is often quickly destroyed, and an excessive flame temperature is often found localized at the outlet of the burner passage.

The object of the invention is to protect the surface of the burner passage and also to obtain a more advantageous distribution of the flame temperature; and for this purpose there is employed, in conjunction with the burner passage, a tangential, eccentric, or other non-radial air inlet, which directs the air at right-angles to the axis of the gas stream and causes the air to swirl around the gas stream. The velocity of the air is such that it can persist in the swirling condition sufficiently long to enable it to form a lining which prevents the gas from coming into contact with the surface of the passage; and that complete mixing of the gas and air which would result in an excessively high local flame temperature is avoided.

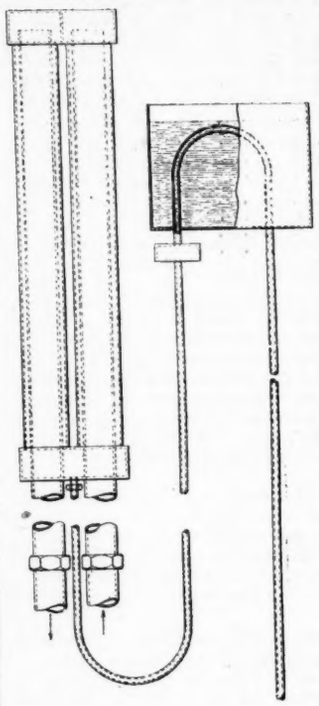
Controlling the Gas for Water-Heaters.—No. 183,370.

EWART, J. W., and FIDDES-STOKES, A. E., both of Euston Road.

No. 21,769; Aug. 16, 1921.

This invention relates to means for controlling the supply of gas for heating water-heaters. It has been proposed in apparatus of this class, so as to ensure the uniform, continuous, and simultaneous supply of liquid and gas, to utilize such water supply to actuate an aspirator to produce variations in the level of a column of mercury which acts as a seal in the gas supply pipe.

According to the invention, a U-shaped pipe is employed through which the gas passes to the burner of the water-heater, and means are provided whereby the water supply to the heater will, when it is cut off from the latter or becomes defective, form a seal in the U-shaped pipe to cut off the gas supply to the burner. When the water supply is turned on to the heater, the seal will be removed, allowing free passage of gas to the burner.



Ewart's Syphon Control for Geysers.

In a suitable arrangement for carrying out the invention [a sectional elevation is reproduced], the lower part of the U-shaped chamber is connected to a tank fed from the water to be supplied to the heater, so that water can flow from the tank (the pipe being perforated near the bottom of the tank) into the U-shaped pipe and forms a seal which normally cuts off the flow of gas to the heater. The water pipe, in addition to opening into the tank, is also extended up within the tank and bent over and extended so as to form the longer leg of a syphon pipe; the highest part of the bent portion of the pipe within the tank also having a hole.

By this arrangement, if the tank be constantly supplied with water so that the level is maintained above the bent portion of the syphon pipe, the seal water will be withdrawn from the U-shaped chamber by the action of the syphon pipe, so that the gas will be free to flow to the burners of the heater. If, however, the water tap of the heater should be closed or the supply fail, the syphoning action will cease, so that water will again flow into the U-shaped chamber and create a seal. In this latter case, the flow of water to the heater through the syphon pipe will lower the level in the tank so as to expose the hole in the upper part of the bend and thus allow air to enter and destroy the syphoning action. Water will then flow from the tank into the U-shaped chamber or pipe and again seal the lower part thereof, thus shutting off the supply of gas to the burners

Oscillating Bells Gas-Meters. No. 182,562.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ and HEELEY, G., both of Paris.

No. 9949; April 4, 1921.

This invention relates particularly to gas-meters of the type in which two alternately oscillating liquid-sealed bells are suspended to rocking levers interconnected with one another and with the gas distributing mechanism, so that a rotary motion is imparted to the principal axle of the recording and distributing mechanism by means of suitable connecting rods actuated by the bells.

According to the invention, a distributing slide-valve mechanism is substituted for the rotary-valve mechanism; the moving parts, except the bells and supporting levers, being protected from the contact of the gas and of the vapours of the liquid by means of a flexible membrane clamped between the parts of a ball-and-socket joint adapted constantly to press the slide valve against the distribution plate.

Pipe Joints.—No. 183,493.

BILBROUGH, C. F. S., of Burnham-on-Crouch.

No. 2367; Oct. 18, 1921.

This invention relates to pipe joints of the kind wherein the end to be connected is expanded within a screw-threaded socket whose passage increases in diameter from the mouth where the pipe enters, and wherein there is employed a hollow exteriorly threaded tapered plug adapted to screw into the pipe and expand the latter within the socket, and formed with diametral slots for the reception of a screw-driver blade.

There is provided a flange to the socket member formed with holes therethrough for the reception of screws, a co-operating socket having a flange with screw-threaded holes for the engagement of the screws, and an annular conical projection on the end surface of one socket adapted to seat on to the corresponding bevelled seating of the other socket.

Gas Cooking Stoves.—No. 183,757.

REES, T. Ll. H., of West Kensington, W. 14, and BILLINGTON, W. J., of Tooting, S.W. 17.

No. 27,751; Oct. 19, 1921.

This invention relates to stoves in which both the oven and the hot-plate are heated by the hot gases from the hotplate burners, for which purpose they are caused to pass round and through the oven before entering the flue.

The feature of the invention is that the air spaces at the side of the oven extend uninterruptedly the full height of the oven, and are open at the bottom for the admission of the air for supporting combustion and heating the oven.

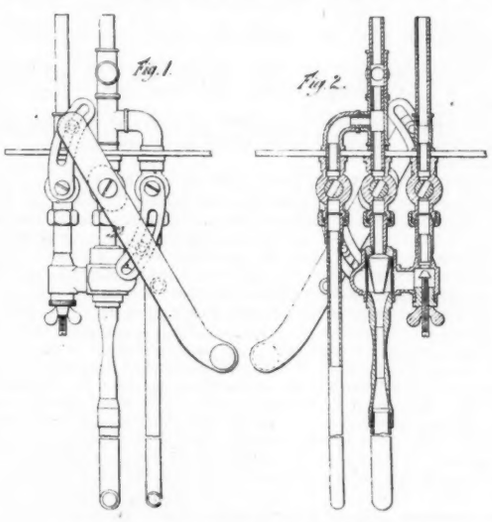
Gas and Air Regulator.—No. 183,862.

SOUTH METROPOLITAN GAS COMPANY, CHANDLER, D., and COOKE, J. J., all of Old Kent Road, S.E. 15.

No. 11,052; April 15, 1921.

This invention relates to actuating by means of a common device the gas and air valves and the like for the supply to a burner, and is especially suitable for furnaces such as "glory hole" or "shell-nose heating" furnaces, in which a portion of the air required for combustion is led in at an angle to the flame. According to the invention the plugs of the cock for regulating the supply of gas, of that for regulating the supply of a portion of the air for combustion, and of the one for the supply of the remaining portion of air for combustion, are all connected to a common handle or other actuating device.

In one way of carrying out the above, the three cocks are arranged in line and the plug of the central cock has fast with it an actuating bar provided with a pair of studs adapted to engage respectively the



A South Metropolitan Gas and Air Regulator.

walls of slots or grooves in arms fast with the plugs of the two outer cocks. The arrangement is clear from the drawings, of which fig. 1 is a front elevation and fig. 2 a part sectional elevation from the back.

The air and gas supply pipes are each provided with a valve by means of which the supply can be regulated.

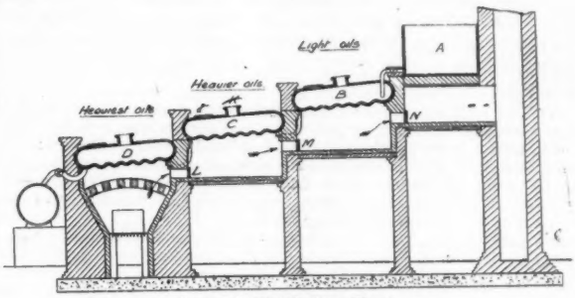
Continuous Distillation.—No. 183,682.

YEADON, J. A., of Leeds.

No. 17,775; June 30, 1921.

This invention relates to the continuous distillation of coal tar by passing it through a series of shallow stills of special design and construction, which are preferably made of steel plates and of a rectangular form, either square or oblong.

The general arrangement is shown in the drawing. The bottom or under surface of each of the stills is made corrugated, these corrugations being formed transversely from side to side, and extending the full length of the under surface of each still. The corrugations are designed to secure three important advantages: (1) They add to the strength of the still; (2) they secure a greatly increased heating surface; and (3) by causing the coal tar to be in a constant stage of agitation in its rippling passage over the corrugations, they largely increase the efficiency, and also prevent the deposit of any solid matter as the tar ripples over them. The dimensions and forms of the stills can be regulated to suit the quantity and quality of the coal tar to be dealt with.



Yeadon's Distillation Plant.

The stills can be heated (as shown) by one main fire or furnace under still D, the heat then passing forward through L and under C; thence forward through M and under still B; the spare heat passing through the flue N, and being utilized to warm the coal tar in the supply tank A before it enters B. There is a suitable arrangement of dampers to regulate the required temperature under each still. If found preferable, each still may be heated by a separate fire, or gas may be used for heating instead of fire heat.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 23.]

Nos. 22,019 to 22,653.

BAWDEN, H. M.—"Cooking-stoves." No. 22,184.
BELYAVIN, P.—"Cooking-appliances, &c." No. 22,485.
BYRNE, G. G.—"Cooking-stoves, ranges." No. 22,081.
CLEMENTS, G.—"Gas furnace and blow torch." No. 22,230.
DAVIDSON, T. M.—"Destructive distillation of coal," &c. No. 22,198.
DOUGLAS, R. P.—"Manufacture of sulphate of ammonia." No. 22,347.
ELLIS, G. T.—"Gas-stoves, rings," &c. No. 22,509.
FLETCHER, A. J.—See Bawden, H. M. No. 22,184.
GES. FÜR KOHLENTECHNIK.—"Process of removing sulphuretted hydrogen from gases." No. 22,127.
HUDSON, B.—"Complete coal gasification plant." Nos. 22,475, 22,476.
HUDSON, E. H.—See Hudson, B. Nos. 22,475, 22,476.
KIRCHHOFF & CO.—"Electric gas-purifiers." No. 22,591.
MARKS, E. C. R.—"Combined gas and electric cooking apparatus." No. 22,648.
MOREY, J.—"Safety attachment for gas-taps," &c. No. 22,343.
O'GRADY, A. H. W.—"Gas-stoves." No. 22,308.
OPPEN, E.—See Kirchhoff & Co. No. 22,591.
PICKARD, W.—"Production of combustible gases." No. 22,280.
PIGGOTT & CO., LTD., T.—"Pipes and pipe joints." No. 22,164.
SALVISBERG FABRIK ELEKTRISCHE KOCH- UND HEIZAPPARATE SALVIS, E.—See Marks, E. C. R. No. 22,648.
URE, A. M.—"Heating and cooking stoves." No. 22,618.
WHITELEGG, S. H.—"Gas cooking-stoves." No. 22,075.

Woking District Gas Company.—The half-yearly report of the Directors show that receipts from the sale of gas indicate a decrease of 7·32 p.ct., compared with the corresponding period of 1921, and the sales of residual products a decrease of 34·59 p.ct. On the other hand, the expenditure on revenue has decreased by £3612, or 14·78 p.ct. The revenue for the half year has been £23,548, and the expenses on revenue account £20,820—leaving a net profit of £2728, to which has to be added the balance brought forward from the last account—£1470. After making the usual charges for interest, &c., there remains an available balance of £3043. Out of this the Directors recommend the declaration of dividends at these rates per annum: On the "A" and "B" ordinary stock, 5 p.ct.; on the "C" preference, 5 p.ct.; on the 5 p.ct. redeemable preference, 5 p.ct.; and on the 8 p.ct. redeemable preference, 8 p.ct. These dividends will absorb £2116; leaving a balance of £927 to be carried forward.

Harrow and Stanmore Gas Company.—In their half-yearly report, the Directors state that the business has been well maintained; the sale of gas showing an increase of 4·84 p.ct. on the corresponding previous half year. The price charged for gas was 13·6d. per therm, against 14·4d. the previous half year, which was further reduced to 13d. from midsummer. The works, which have been well maintained, have been equal to all demands made upon them; but with a district developing so considerably, further additions to the works and mains will be required. The coal supplied for the current year has been secured on more favourable prices; but there is a considerable reduction in the price realized for the residuals. The balance standing to the credit of profit and loss is £16,276. The Directors recommend that dividends be declared for the half year at the rate of 6 p.ct. per annum on the ordinary stock, and 5 p.ct. per annum on the preference stock, both less income-tax—leaving £8936 to carry forward to the next half year.

MISCELLANEOUS NEWS.

THE GAS LIGHT AND COKE COMPANY.

Reorganization of the Stove and Meter Department.

We learn from the Secretary of the Gas Light and Coke Company (Mr. W. L. Galbraith) that Mr. W. F. Fagan is shortly retiring from the post of Manager of the Company's Stove and Meter Department, and consequent thereon it is proposed to reorganize the Department as follows:

(1) The work of collection, distribution, and maintenance of stock of stoves and meters, &c., and the appropriate staff will be transferred to the Stove Department under Mr. W. McDowall;
(2) Mr. E. C. Holt, Divisional Inspector, Gas Sales Department, has been appointed Local Manager of the Haggerston Works; and
(3) Mr. F. S. Larkin has been appointed Local Manager of the Fulham (Stove and Meter) Works.

We wish all these gentlemen the utmost success in their new spheres of work.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

Nottingham Corporation.

The standard price now authorized in respect of the supply of gas is 3s. 6½d., 3s. 5½d., 3s. 4d., 3s. 2¾d., and 3s. 1½d. per 1000 c.ft.; and the price which the undertakers have asked the Board of Trade to substitute for this is 13·8d., 13·6d., 13·4d., 13·2d,, and 13d. per therm.

DECLARATIONS OF CALORIFIC VALUE.

Barnsley Gas Company.—500 B.Th.U. (Sept. 30.)
Halesowen Gas Company.—440 B.Th.U. (Sept. 1.)

GAS REGULATION ACT ORDERS.

There have been received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Barnsley Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 14d. per therm.

The minimum permissible pressure at which gas shall be supplied by the undertakers shall be such as in any main or in any pipe laid between the main and the meter having an interna diameter of 2 in. and upwards to balance a column of water not less than 2 in. in height.

Provided that—

The foregoing provision shall not apply to the two areas defined in the first schedule to the Order until the expiration of one year from the date of the Order, and during the said period of one year, the pressure at which all gas supplied by the undertakers to any consumer within the said areas shall be supplied shall be such as in any main or in any pipe laid between the main and the meter having an internal diameter of 2 in. and upwards to balance a column of water not less than 15-10ths of an inch in height.

The areas referred to in the first schedule are part of the former urban district of Ardsley (now included in the county borough of Barnsley) and part of the urban district of Dodsworth. (Aug. 21.)

Llynvi Valley Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 20d. per therm, and this price shall be substituted for the price of 4s. 9d. per 1000 c.ft. wherever it is mentioned in section 17 (price of gas) of the Llynvi Valley Gas Order, 1909.

After the declared date, the word "therm" shall be substituted for the words "1000 c.ft.," and the words "fifth of a penny" for the word "penny" wherever they occur in paragraph (ii.) of the schedule to the Llynvi Valley Gas Order, 1909. (Aug. 18.)

SPECIAL ORDERS.

Smethwick Corporation (Gas).

The Corporation are applying for a Special Order under section 10 to authorize them to borrow or raise further moneys for the purposes of their gas undertaking; to prescribe the mode of raising the moneys; to provide for the formation of a sinking fund; and to form a new depreciation fund in lieu of that already existing.

York Town and Blackwater Gas Company.

Application is intended to be made by the Company for a Special Order to extend the limits of supply of gas, and to make provisions as to the price or prices to be charged within the area to be added.

Recently published information shows that the British Dyestuffs Corporation can trace an unbroken lineage from the pioneer of synthetic dyes, William Henry Perkin, who discovered mauve in 1856. To-day the Corporation employ 300 trained chemists and 6000 workpeople, operating on 50 acres of floor area scattered over 1450 acres of land.

THE INDUSTRIAL RESEARCH LABORATORIES AT BIRMINGHAM.

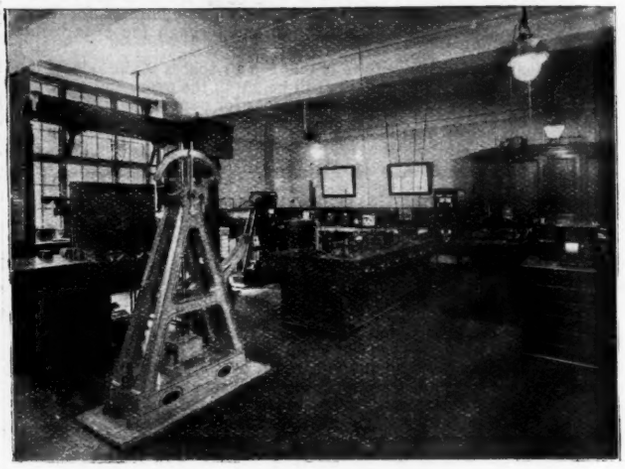
The Industrial Research Laboratories of the Birmingham Corporation are an institution that have rendered excellent service to the city's industries. The Engineer-in-Charge is Dr. C. M. Walter; and his large interest in this work is well known to all who have followed his contributions to this branch of technical work. One of the latest enterprising features inviting manufacturers to make use of the laboratories is a card, which reads as follows:

INDUSTRIAL RESEARCH LABORATORIES — CITY OF BIRMINGHAM GAS DEPARTMENT COUNCIL HOUSE.

All progressive manufacturers of any industry are invited to apply to the laboratories for assistance in dealing with their various problems.

The need for suitable and efficient types of gas-furnaces may not be fully appreciated until a visit to the Laboratory Demonstration Rooms has been made.

The heat-treatment shops are fitted with various types of solid fuel and gas-fired furnaces for carrying out on a commercial basis all classes of heat-treatment, including annealing, case-hardening, plain carbon and high-speed steel tool hardening, metal colouring, and metal melting.



Industrial Testing Laboratory.

In order to ascertain the results of heat-treatment on materials, physical and metallurgical testing appliances have been installed at the laboratories.

A large amount of other testing and experimental work has already been carried out, and a list given below shows the capacities of the laboratories.

The laboratories are equipped for the following tests:

Tensile, compression, bending, torsion, strength of springs, sclerescope and brinell hardness, impact strengths, coefficient of expansion, cements and concretes, lubricating oils, case-hardening penetration tests; also investigation of failures of material, measurements of electrical resistance, calibration of pyrometers, microscopical investigation of metals.

USEFUL TECHNICAL INFORMATION.

1 inch	=	2·54 centimetres.
1 centimetre	=	·3937 inch.
1 pound	=	·4536 kilogramme.
1 kilogramme	=	2·205 lbs.
°C.	=	(°F − 32) × 5/9.
°F	=	(°C. × 9/5) + 32.
1 therm	=	100,000 B.Th.U.
1 ,,	=	39·37 I.H.P. hours.
1 ,,	=	29·34 kilowatt hours.
1 atmosphere	=	14·7 lbs. per sq. in.
1 ,,	=	760 mm. mercury.

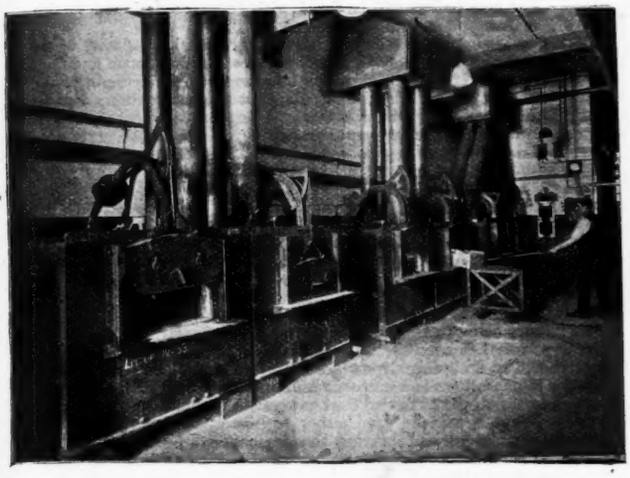
A column of water 2·307 ft. high corresponds to a pressure of 1 lb. per sq. in.

Melting Points.

Material.	Deg. C.	Deg. Fahr.
Sulphur	115	239
Tin	232	450
Lead	327	621
Aluminium	657	1215
Common salt	801	1474
Silver	961	1762
Gold	1063	1945
Copper	1083	1981
Nickel	1452	2646
Iron	1505	2741

Tensile Strength.

Material.	Tons per Sq. In.
Mild steel up to 0·3 p.ct. carbon	28-32
Medium steel, 0·3 — 0·45 p.ct. carbon	38-42
Wrought iron	18-24
Brass, 60:40	18-20
,, 70:30	13-15
Gun metal adm. No. 1 cast	14-18
Portland cement (neat)	450 lbs. min.
Cement: Sand :: 1:3	200 lbs. min.



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Manufacturers need have no hesitation in bringing to the laboratories work of a confidential nature, and can rely in such cases upon the utmost care being observed.

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TAUNTON GAS LIGHT AND COKE COMPANY.

Reconstruction Justified.

The annual meeting of this Company has been held; and on the strength of the report and the proceedings generally, we congratulate the Secretary and Manager (Mr. C. Harris). Taking into account the depreciation written-off consequent on the renewal of the carbonizing plant, the Company showed the most successful financial year in their existence, and the results have completely justified the extensive modernization of the works carried out during the past few years. The report showed that the quantity of gas sent out during the past year has been 149,038,500 c.ft.; being an increase of 5,552,600 c.ft., or 3·8 p.ct. more than was sent out during the preceding twelve months. The amount available for dividend is £3778; and, an interim dividend having been already paid, the Directors recommended dividends at the standard rates for the six months—viz., 5 p.ct. on the 1897 preference stock; 7 p.ct. on the 1920 redeemable preference stock; 8 p.ct. on the consolidated "A" stock; 7 p.ct. on the yellow shares; and 7 p.ct. on the new (1897) ordinary stock. These dividends will absorb £2840; leaving £938 to be carried forward. The new carbonizing plant has worked very satisfactorily during the year, effecting considerable economies and making it possible for a further amount to be placed to the credit of the retort renewals suspense account, reducing the latter to £5502.

The CHAIRMAN (Mr. W. H. Fisher), in moving the adoption of the report, said it would be observed that there had been a satisfactory increase in the amount of gas sold, notwithstanding the general depression in trade. He was pleased to say that, by the Company's Order under the Gas Regulation Act, the power to pay the usual dividends had been regained. The Directors had thus pleasure in recommending the payment of standard dividends, although these were still slightly below pre-war ones. The improved working results of the new carbonizing plant had resulted in lower costs, enabling the price of gas to be reduced; and the Directors confidently hoped they would be able to announce still further reductions in the near future. The number of gas apparatus fixed during the year had been abnormal—over 500 cookers, fires, geysers, wash-boilers, and water-heaters having been supplied to various consumers, and gas wash-boilers in particular were being almost universally adopted. A disused gasholder tank was being adapted for use as a road tar storage tank. This would enable the Company to store the whole of the winter's make of tar, and to turn out a uniform product. The supply of road tar had now become an important part of the gas business; and the revenue from this had materially helped in reducing the cost of gas manufacture. A briquette manufacturing plant was being installed, and would be working in the course of the next few weeks. This would meet a demand for a slow-burning fuel, which could be sold at a cheaper rate than anthracite, coal or coal briquettes, and at the same time use up the bye-products the Company made.

The DEPUTY-CHAIRMAN (Mr. R. Bruford), in seconding, said the Company had rendered their accounts so that the charge was shown both by the 1000 c.ft. and also by the therm, so there has been no ambiguity due to the introduction of the new system of charge. The consumers had benefited materially by the fall in the price of gas. The charge for gas for this year's June quarter was £1500 less than the June quarter twelve months ago, although the amount of gas sold was practically the same in each case. The only conclusion was, that while some accounts were, of course, more, due to greater use, in the majority of cases consumers had used about the same amount of gas or even less, and had had lower bills.

The report was adopted.

The Dundalk Gas Company have declared dividends of 15s. per share on the "A" shares and 10s. on the "B" shares. Both are the same as last year.

PUBLIC LIGHTING AT LEAMINGTON.

Gas Wins.

The Leamington Town Council have (as briefly announced last week) been discussing the question of the renewal of the contract for public lighting. The result is that gas lighting is to be continued. The new lanterns throughout the town will be Parkinson's 16 in. square lanterns fitted with a pair of inverted No. 1 bijou burners, and Sugg's four-burner "Littleton" lamps—the latter being attached to brackets on the tramway standards. All the lamps are to be fitted with the Horstmann controller. We congratulate the Company and the General Manager and Engineer (Mr. R. S. Ramsden).

Referring to the matter, the "Leamington Courier" says: Should the Parade and Bath Street be illuminated with electric or gas light? This was the bone of contention at the last meeting of the Leamington Town Council, when, approving the recommendation of the Watch Committee, it was decided to continue with gas. The deciding factor, according to Alderman Flavel, was the financial aspect. The Electric Light Company's estimate for lighting the Parade and Bath Street was stated to be £14 less than the cost of gas. It was pointed out, however, that a capital expenditure of £800 would be involved in installing electric light. The Mayor's view that this was not warranted when the Gas Company were improving their light throughout the town, was accepted by the Council.

The Watch Committee reported that they had most carefully considered the Borough Engineer's report with regard to street lighting. After interviewing the Managers of the Electric Light and Gas Companies and fully considering their respective offers, the Committee recommended that gas lighting be continued, that automatic lighting and extinguishing be adopted, and that new lanterns with inverted burners be fitted throughout the town. Further, that an agreement be entered into with the Gas Company for a term of five years on the following terms:

The Company to supply new lanterns, burners and clock controllers fitted to standards complete for the sum of £4450, to be repaid within five years by equal quarterly payments of £222 10s., the lanterns, controllers, &c., to become the property of the Council at the end of five years.

The Company to reduce the maintenance charge for high-pressure lighting by 50 p.ct.—viz., from £50 to £25.

The Company to supply gas for public street lighting at 10 p.ct. below the current price instead of the present reduction of about 5½ p.ct.

The proposal led to a spirited discussion, which ended in the confirmation of the Committee's recommendation.

NOTTINGHAM AND THE THERM SYSTEM.

Strong attempts continue to be made in Nottingham to stimulate opposition to the application of the Corporation to the Board of Trade to institute the therm method of charging. Ratepayers are being urged, by those who have taken a leading part in the agitation, to combine in making representations to the authorities against a system which, in unnecessarily strong language, is condemned as permitting of a species of robbery. The protest of the Metropolitan gas consumers is being cited as justification for energetic action; and it is suggested that such a force of public opinion should be brought to bear in relation to the matter that the City authorities may be compelled to desist from taking further action. In attempted support of this contention, a great deal which is unwarranted has been introduced into the controversy. It is asserted, for example, that the adoption of the heat-unit basis will involve consumers in paying nearly twice as much as hitherto, without any corresponding increase in the value of the gas for either illuminating or heating purposes.

There is no doubt that a very strong feeling of irritation has been engendered in Nottingham and in its extra-municipal areas of supply against the action of the Corporation; but this may be said to be largely due to the fact that the Committee primarily responsible for advocating the change has made no attempt, by furnishing comparative data, to remove misconceptions which have been allowed to develop through an imperfect understanding of the facts. It is possible, therefore, that some pertinent interrogations, at the next meeting of the Council, may elicit information to demonstrate that the purpose of the change is not to inflict further imposts upon already heavily burdened consumers, but to place the system of charging upon a basis that is equitable and in accordance with modern-day needs.

A Satisfactory Increase at Romford.—The report of the Directors of the Romford Gas and Coke Company, Ltd., presented to the meeting of shareholders on Saturday last, showed a gross profit for the half year to June 30 of £4820. This amount, added to the balance brought forward from the previous half year, made an available total of £7597. After providing for reserve fund, interest on uninvested funds, bank interest, debenture bonds, and other charges, there remained a net balance of £5896. Dividends were declared for the half year at the rate of 6¾ p.ct. on the "original" shares, and 5¼ p.ct. on the "B" shares, both less income-tax. These dividends amounted to £3093; leaving a sum of £2802 to be carried forward. The sale of gas showed a satisfactory increase over the corresponding period of 1921, and the price had been reduced by 1d. per therm as from the reading of the meters for the Midsummer quarter. The Company's application under section 10 of the Gas Regulation Act, 1920, resulted in the issue by the Board of Trade on April 12 last, of the Romford Gas Order, 1922. Two new funds authorized by this Order—viz., the special purposes and renewal—appeared in the accounts for the first time. The insurance fund, which previously existed, being incorporated with the special purposes, the credit balance of the former as at Dec. 31 last formed the nucleus of the latter fund.

SMETHWICK GAS-WORKS EXTENSIONS AND NEW SHOWROOMS.

Extracts from an Article in the "Smethwick Telephone."

Within a stone's throw of the gasholder which Murdoch the pioneer of gas-making erected, and within ear-shot of the works which over 120 years ago he first illuminated, there is being carried out the greatest development in any municipal enterprise upon which Smethwick has ever entered. In other words, the "home" of the great illuminant is the centre of activities which will involve an expenditure of some £180,000. The initial stages are now well in hand; and the Council have committed themselves to an expenditure of £70,000 in view of the larger project which lies ahead. These, and many other interesting facts were recalled on Monday last at the ceremony associated with the opening of new showrooms in High Street—a well-conceived and admirably arranged scheme for developing the further use of gas in the home.

The occasion was of much significance from the civic, commercial, and domestic point of view, for all of these are vitally affected by the great venture around which the proceedings centred. First of all, there was a visit by members of the Council to the gas-works. The scheme of re-organization and re-construction was explained by the Engineer and Manager (Mr. Ernest Hardiker, F.C.S.), under whose supervision the work is being carried out.

Coming from the gas-works to the Council House, the party was joined by the ladies; and the whole were the guests of the Chairman (Mr. Councillor S. W. B. Stephen) and members of the Gas Committee.

Mr. STEPHEN, in extending a welcome, mentioned that the Gas Department had before them a very great task. They would know from the public pronouncements made from time to time that there was involved in connection with the gas-works a very great expenditure in order to bring the plant up-to-date, and the installation of such methods of manufacture that would enable them to produce gas very much cheaper than was possible under the old *régime*. The Councillors had been to the works on a visit of inspection, in order to get an idea of the scheme, and how the money was being spent. He hoped it had afforded them some idea as to what the Gas Committee were endeavouring to accomplish in connection with the town's largest enterprise. The provision of a new gasholder, the erection of new purifiers, and many other things they had entered upon would not bring in a penny of revenue; but they were part and parcel of a great undertaking. Now to meet that expenditure, the Gas Committee were naturally anxious to foster and encourage the use of gas. With this idea in their minds they had deemed it wise to open a showroom in order to bring before the public the most up-to-date appliances and to indicate how and why it was to their advantage to use gas. They felt sure that with what they had undertaken they would ultimately be in a position to supply gas as cheaply as anywhere in the Midland counties. Being at a distance from the coal-field, they had many impositions to bear: 7s., 8s., and 9s. a ton was represented in railway rates (even with the benefit of recent reductions), while wagon hire was also an item. It was not, therefore, fair to compare the price of gas in Smethwick with those towns in an ideal situation. But they were out for efficiency in gas manufacture as a means of cheapening the product; so they wanted to bring to the notice of the public the use of gas for manufacturing purposes, and for lighting, heating, and cooking. The Chairman invited the Mayor to perform the opening ceremony of the new showrooms.

The Mayor having complied, the visitors made a tour of inspection. HIS WORSHIP then said he was sure that the visitors would be impressed with the arrangement of the showrooms. Some of the advantageous uses to which gas could be put in the home would be new to some of them. As a matter of fact, it was a very big question whether there had been a greater advance in recent years in regard to any commodity than that of the production of gas and the appliances for its efficient use. It seemed to him that the manufacturers of these appliances had taken to heart the need that existed for improvements in this regard so that there could be the utmost efficiency. He commented upon the labour-saving of gas, and upon the improvement in the general healthiness of the home, the town and the country as the result of the use of gas instead of coal. He congratulated the Chairman and members of the Gas Committee and the officials—Mr. Hardiker, Mr. Davis, Mr. Skidmore and Miss Hill (who is in charge of the new department).

THE GAS-WORKS EXTENSIONS.

The plant at present under construction is part of a larger scheme drawn up by the Gas Engineer and Manager (Mr. E. Hardiker). The process of reconstruction will of necessity be a gradual one, and will take several years to complete.

The vertical retort installation is being remodelled on improved principles, and in connection with this plant a waste-heat boiler has been installed. The old coke-handling plant which had become obsolete, and was giving rise to excessive maintenance charges, and breakage of coke into breeze, has been replaced by an electric telpher coke-handling plant, by means of which the coke is carried some 30 to 40 ft. above ground level, direct from the retort-house to any part of the storage yard, or to the screening plant, and carburetted water gas house. New elevators and bunkers have been erected for dealing with the coke required for heating the retorts, and provision has been made for the removal of the ashes from the retort-settings, and loading into canal barges.

The carburetted water-gas plant has been entirely remodelled, and what was once a plant capable of producing a million cubic feet of gas per day, is now one that will yield almost double that amount. As an aid in obtaining proper adjustment of the plant, it is completely equipped with batteries of pressure-gauges, steam and air meters, pyrometers, &c. A new turbo-blower is also being installed; and the system of oil and water pumping arrangements is being reorganized.

A well-designed boiler house and stack is in course of construction, and will house two 28 ft. by 8 ft. Lancashire boilers, put down to replace two of a smaller size, which had been in use for the last forty years. The new boilers will be fitted with furnaces designed to consume coke dust and sweepings.

The increased demands for gas have outgrown the capacity of the purifiers. It has been decided to erect others of a larger size and more modern type, together with plant for handling the purifying material, and to utilize several of the present ones for the purification of water gas. The foundations which are now being prepared are in ferro-concrete, on the Coignet system.

A brief inspection was also made of the new Venturi meter, the water-softening plant, and the meter-repair shop.

THE SHOWROOM.

The showroom is fitted up with all kinds of modern appliances, both useful and ornamental. Included among these are cookers with efficiency hotplates. Appliances for gas-fires, finished in various styles, are also in evidence. Grillers, boiling-burners, gas-irons, radiators, are all well represented; there being various makes and sizes. There is a particularly wide and artistic selection of shades, both in silk and beads; these being in various qualities. In the gas-fitting line a very imposing array has been assembled, all of which are produced in the borough. The designs are most artistic.

In the kitchen there is a useful combination grate, which emphasizes the uses to which gas coke and coal gas can be conjointly put. It is so connected that it may be used either separately or together for the purpose of cooking, and heating the ordinary hot-water circulating system, which is directly circulated both to the kitchen sink and to the bath-room apparatus.

Sugg lamps for outside lighting are seen; and a novel form of distance lighting is installed.

There are one or two other interesting exhibits, which show the uses to which gas has been locally put. Aluminium ware on show has been manufactured locally; the metal having been reduced in furnaces entirely heated by gas. There is also a beautiful selection of Ruskin Pottery, which has a world-wide reputation. It may not be generally known that it is manufactured in the borough. This is also interesting from the fact that in the course of the manufacture they pass through gas kilns, some of which are heated at ordinary pressures to 1300° C.

CORNISH ASSOCIATION OF GAS MANAGERS.

The President of the Cornish Association of Gas Managers is Mr. William Nicholls, the Manager and Secretary of the Penzance Gas Company, Ltd. His tenure of the office of President was celebrated last Wednesday in a festive manner. Officials of the various Cornish gas companies, with their ladies, were welcomed at the offices of the Penzance Gas Company, where they inspected the works and were entertained at luncheon, afterwards visiting some of the wild hinterland and north-west coast. At the luncheon, regret was expressed that the present Chairman, Alderman Tonking, J.P., was unable to be with them; but the honour of representing the Board fell upon two excellent substitutes in the persons of Mr. J. Vivian Thomas and Mr. Pengelly.

Mr. NICHOLLS presided at the luncheon; and after the toast of "The King," he and the Directors present gave hearty welcome to the guests. The President regretted the absence of Mr. Tonking, who is now on a visit to the United States.

Mr. J. VIVIAN THOMAS, in the course of his welcome, assured those present that during the 34 years Mr. Nicholls had been Secretary and Manager of the Company, he had fully justified their confidence in his loyalty and ability. His success was largely due to the admirable work of every member of his staff. He referred to the arduous times that gas managers had had since the war, and said they were often blamed for things over which they had no control, and for which they deserved no censure whatever. He heartily welcomed the visitors to Penzance.

Mr. PENGELLY also endorsed Mr. Thomas's expressions of welcome, and bore further testimony to the good work of the Manager.

The MAYOR (Mr. Mabbott), who was present with the Mayoress, likewise testified to the excellent qualities of his tried and true friend Mr. Nicholls. He believed that in Penzance they had a model gas-works.

Mr. H. T. RILEY (St. Austell) and Mr. F. J. KINGWELL (the Hon. Secretary of the Association), of Falmouth, responded to the welcome by the Directors, and Mr. S. J. INGRAM (Truro) and Mr. E. C. MARTYN (Wadebridge) responded to the welcome by the Mayor of the Borough. The last-named gentleman said that the members hoped that Mr. Nicholls would retain the office of President for several years. They found the Penzance gas-works in admirable order. It was the largest gas undertaking in Cornwall, and was perfectly kept. For its size, too, the Company was one of the most successful in the country.

There were various other toasts, after which the visitors had a most delightful drive through Heamoor and Madron to Lanyon Cromlech and Morvah, and on to Gurnard's Head. The journey was continued to St. Ives and Carbis Bay; the return trip being made *via* Lelant to Penzance, where tea awaited the party. It was a most enjoyable holiday.

Winchester Water and Gas Company.—In their report for the half year ended June 30 last, the Directors state that the balance of net revenue account available for dividend is £3947, and they recommend the payment of a dividend on the preference stock at the rate of 4 p.ct. per annum, less income-tax, and on the consolidated ordinary stock at the rate of 4½ p.ct. per annum, less income-tax, for the half year. The application mentioned in their last half-yearly report was duly made to the Minister of Health for an Order under the Water Undertakings (Modification of Charges) Act, 1921, to empower the Company to increase their charges for water. Negotiations relating thereto had taken place with the Corporation of Winchester and others, and, after conferences with them, all objections had been withdrawn; and it was hoped that an Order would be made by the Ministry in the near future. The price of gas was reduced at Lady Day from 1s. 5d. to 1s. 4d. per therm; and the Directors hoped to announce a further reduction before the end of the year.

CHESTER GAS COMPANY.

The half-yearly meeting of the Chester United Gas Company was held on Aug. 17, Sir JOHN FROST presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, stated that the coal strike last year was reflected in the decreased cost of coal and reduced receipts from coke sold. The sales of gas had realized £39,395—a satisfactory increase of 5·58 p.ct. over the corresponding period of 1921. New items appearing in the accounts were rentals for prepayment meters and fittings and ordinary cookers on hire. Coke sales showed a drop of £5568, largely due to depression in the industrial world and the absence of the artificial demand created by the coal strike. Tar also was down; but sulphate of ammonia showed a profit, as against a *nil* return last year. They hoped now to benefit by having introduced the manufacture of neutral dry sulphate. The expenditure on coals showed a reduction of £7003; their purchases having been by spot lots or short contracts, and a better quality being obtainable. Wages and salaries also were less; and he was able to record a satisfactory decrease in rates and taxes. The Company's contribution to the Board of Trade Gas Fund was £49 19s. After payment of maximum dividends, there would be a much larger balance than of late in the accounts; but this would be further reduced by income-tax adjustment. The repairs to works had been below the normal. There would be heavy Parliamentary charges to meet in the autumn in connection with the new Act. They were glad, however, to be able to reduce the price of gas from 1s. to 11d. per therm as from July 1. The present prices were equivalent to 4s. 2·6d. per 1000 c.ft. for household purposes, and 3s. 6·32d. for industrial use; and there was hope of a further reduction at the end of the year. The Chairman then proceeded to give details of the new Act, which received the Royal Assent before the Houses adjourned. [Full particulars of the Act have appeared in our pages—see "JOURNAL," July 26, p. 216.] He recorded that the Company's relations with the Corporation had been quite cordial in relation to the Act.

THE NEW GASHOLDER.

The last paragraph of the report referred to the new gasholder, which had been found necessary owing to the gas consumption having been doubled in the last 28 years. The holder was being erected under contract with Messrs. Newton, Chambers, & Co., Ltd., and would have a capacity of 1½ million cubic feet. The foundation contract had been placed with Messrs. J. & W. Stewart, of London. It was expected that the work would be completed by the end of next summer. An extraordinary general meeting would be convened after the ordinary half-yearly meeting, with a view to approving the issue of £41,890 redeemable debenture stock, which was considered the most advantageous way of securing the necessary capital for the holder.

The CHAIRMAN moved, and Mr. BURGESS seconded, a resolution, which was unanimously carried, for the payment of an interim dividend at the rate of 2½ p.ct. on the ordinary stock of the Company.

At the extraordinary general meeting afterwards, it was resolved that the Directors should be authorized to issue the sum of £41,890 redeemable debenture stock, to bear interest at 5 p.ct. per annum, and to be put on the market at 97½ p.ct.

WARRINGTON CORPORATION GAS ACCOUNTS.

The report of the Warrington Corporation gas undertaking for the year ended March 31 shows an income of £171,475 and an expenditure of £152,077; the net profit being £6821. The income is £14,827 less than last year, which is accounted for by decreases in the sales of gas, coke, and bye-products. The rents of meters, cooking ranges, and cottages have all produced slightly more, and in addition there has been a small increased income from the sale of fittings.

The gas sold was 446,733,908 c.ft., as against 487,842,161 c.ft. last year, and 515,721,900 c.ft. in 1913-14. The net price of gas (ordinary meters) within the borough in 1913-14 was 2s. 1d. per 1000 c.ft.; in 1920-21, from 4s. to 5s. 3d.; and during 1920-21, 5s. 3d. from April to September, and 4s. 6d. for the second half year. The price from April 1 was further reduced to 3s. 10d. net.

The expenditure is £22,546 less than last year, reductions being shown under almost every heading; the chief exceptions, items in excess of the expenditure in 1920-21, being maintenance of mains and services £1649, and coke, &c., £580. Loan charges have increased by £4247, consequent upon additional borrowings for the extensions and the general increase in the rate of interest paid. A sum of £64,321 has been expended upon capital account, making the total capital expenditure to date £378,140. Loans to the extent of £63,044 have been contracted; and debt amounting to £7625 has been repaid. The debt outstanding at March last, capitalizing the annuities at thirty years' purchase, amounted to £206,123. Since the acquisition of the undertaking, debt to the extent of £136,244 has been extinguished.

It is proposed to transfer £6000 of the profits to the reserve fund, and to add the remainder, £821, to the working balance. The reserve fund will then amount to £8714, and the working balance to £21,655. The sinking fund has a credit balance of £7830, of which £7827 is invested. The result of the year's working is slightly better than was anticipated. The loan charges in the future, however, will be considerably increased owing to the heavy borrowings made to meet the cost of the extensions being carried out.

Cheaper Gas at Wolverhampton.—The Directors of the Wolverhampton Gas Company recently announced a reduction in the price of gas as from the September quarter as follows: For lighting and domestic purposes, from 11·6d. per therm (4s. 4·2d. per 1000 c.ft.) to 10·66d. per therm (4s. per 1000 c.ft.). For manufacturing and motive power, from 11·2d. per therm (4s. 2·4d. per 1000 c.ft) to 9·33d. per therm (3s. 6d. per 1000 c.ft.); automatic meters, from 14·8d. per therm, or 15 c.ft. per penny, to 13·88d. per therm, or 16 c.ft. per penny.

SUTTON (SURREY) GAS COMPANY.

In submitting the accounts at the recent half-yearly meeting of the Company, the Directors stated that they were pleased to be able to report satisfactory working results. After carrying £650 to the insurance fund, and £653 to the renewal fund, the profit and loss account showed a balance of £17,338, from which they recommended the payment of a dividend (under the sliding-scale) at the rate of 6 p.ct. per annum (less income-tax) for the six months ended June 30. Owing chiefly to the lower cost of coal, the Directors had been able to announce reductions amounting to 2d. per therm in the selling price of gas (equal to more than 9d. per 1000 c.ft.), to take effect as from the reading of the meters at the end of June. Present prices, therefore, were: In the Sutton and Cheam area, 11d. per therm; in the Worcester Park area, 11·8d. per therm; in the Banstead area, 12·2d. per therm. The Directors recorded with deep regret the death of one of their colleagues, Mr. Thomas Charles, who for 25 years was a Director, and Chairman from 1915 to 1921. To fill the vacancy, Mr. J. Ferguson Bell, for some years Consulting Engineer to the Company, had been elected a Director. Prior to joining the Board, Mr. Bell resigned his position as Consulting Engineer.

The CHAIRMAN (Alderman E. J. Holland, J.P.), in moving their adoption, remarked that he might almost leave the report and accounts to speak for themselves. They would all agree that the results of the half year's working were satisfactory. It would be seen that the price of gas for the current half year in the Sutton and Cheam limits was 11d. per therm, which for a Company of that size, south of the Thames, would be regarded by those competent to judge as a very low figure. When they obtained their Order under the Gas Regulation Act, they fixed the price at 13d. per therm, which was reduced to 1s. in May, and now to 11d. It was true that the price in Wimbledon (supplied by the Wandsworth, Wimbledon, and Epsom District Gas Company) had recently been reduced to 10d., but for the previous half year it was 1s. 2d., so that the average for the year in each case would be 1s. per therm. The reduction in price would benefit consumers to the extent of between £7000 and £8000, and correspondingly reduce the revenue. The Board were steadily pursuing their policy of overtaking deferred renewals, and of improving the distribution system by laying larger mains where required. This work was, of course, almost suspended for several years. As regards the plant, it was hoped that the new purifiers, which were now necessary owing to the increased output, would be in operation by the end of the year.

The report and accounts having been adopted, the Directors' remuneration was increased, and the Board were authorized to issue further capital.

The proceedings concluded with a vote of thanks to the Directors and officials, to which the Chairman and Mr. Henry Gage (the Engineer and Manager) responded.

WORTHING GAS COMPANY.

The ordinary half-yearly meeting of the Worthing Gas Company was held on Saturday last—Mr. WILLIAM CASH presiding.

The Directors' report for the half year showed that the sales of gas continued to reveal a steady and satisfactory increase. Owing to the decrease in the cost of coal and general working expenses, the price of gas had been reduced from 1s. 3d. to 1s. 2⅜d. per therm as from July, which was equivalent to a reduction of 2·82d. per 1000 c.ft. The profit and loss account showed a balance of £18,574; and out of this sum the Directors recommended a dividend of £5 2s. 6d. p.ct. per annum upon the ordinary stock.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said that, so far as the position was concerned in the output of gas as compared with the corresponding half year, there had been an increase of 4,500,000 c.ft., or roughly 4 p.ct. The price a year ago was 6s. per 1000 c.ft. This year it was equivalent to 5s. 10½d.; and that morning the Directors had decided upon another reduction of 2d. per 1000 c.ft., or an equivalent gain to the consumer of £1850 a year, on the top of a previous gain of £2800. Dealing with the revenue account, wages were down by £942, and there had also been a reduction in salaries. Repairs and maintenance of works had increased roughly £1500; but this was attributable to the fact that they had wiped off the debit balance on revenue suspense account. Declaring a dividend of £5 2s. 6d. this half year, they hoped next half year to be able to make the distribution £5 10s. The new works that were in progress were rendered necessary by the growth of their business.

Alderman J. G. DENTON, in seconding, said they could congratulate themselves as shareholders that there was not only a better dividend, but that a lower price was being charged for gas. This was due to the better quality of the coal and its lower price, and to decreased working costs. He hoped that they would be able to reduce still further the price of gas.

The resolution adopting the report was carried.

North Middlesex Reduction.—The fifth reduction in the price of gas within twelve months—the total being equivalent to 11½d. per 1000 c.ft.—is announced by the North Middlesex Gas Company. The new price is 11d. per therm.

Further Reduction in Price at Manchester.—A further reduction of 3d. per 1000 c.ft. in the price of gas in Manchester will be made after the end of September. This was decided upon at the meeting last week of the Gas Committee of the Corporation, presided over by Sir William Kay. Together with the reduction made in March, the total taken off the price during the current year thus amounts to 7d. per 1000 c.ft. It is hoped also that at the end of the financial year in March next it may be possible to give further relief to consumers. The present price to ordinary users is 4s. per 1000 c.ft., provided the account is paid within a month. In the present reduction, large consumers and manufacturers will benefit with domestic users in a corresponding degree.

CHICHESTER GAS COMPANY.

The ordinary half-yearly meeting of the Chichester Gas Company was held on the 22nd inst., Mr. W. A. Walker, the Chairman, presiding. The report stated that the accounts for the past half year showed the effects of somewhat cheaper coal, labour, and other materials, and enabled the Directors to recommend the payment of the maximum dividends. The balance standing to the credit of the profit and loss account amounted to £4774, out of which was recommended the payment of the following dividends: "A" stock 10 p.ct. "B" and "C" stocks 7 p.ct.—all less income-tax, which would absorb the sum of £1567, leaving the balance to be carried forward to provide for interest on the debenture stock and temporary loans which would become due on Dec. 31 next.

The Chairman, in moving the adoption of the report and accounts, said that until the passing of the Gas Regulation Act, which began to operate with their Company on July 1 last year, their position had been one of the greatest difficulty, and even now, as a result of the prices they were compelled to pay for coal and all other materials they required, it was still one of great anxiety. The thing most to be desired in the matter of prices was stability, and until the time arrived when that was possible, uncertainty must of necessity prevail. In connection with the selling price of gas, they had reduced the price 1s. 0½d. per 1000 c.ft. since the Gas Regulation Act commenced to govern their working, and a further reduction would take place before long. There had been an increase of 649,200 c.ft. in the sale of gas for the half year, and a saving of about £497 in routine items; the net decreased expenditure over the half year being £2299. In the sale of gas there had been a reduction of £436 owing to decreased price charged. Rentals for meters had brought in an increase of £87; tar and ammonia a reduction of £705; and the total receipts had shown a drop of £1058. In the number of ordinary customers there had been an increase of 13, and of automatic meter consumers a gain of 16. He had the greatest confidence in the prospects of the Company, although the upheaval of the last eight years had still to be reckoned with.

Mr. J. Cash, in seconding, reminded the meeting that the dividends in the future would not be so large as they had been that day, because the reduction in price they had to make, and the decrease in the value of residual products, must have an effect.

The report and accounts were unanimously adopted.

MIDLAND COAL PRODUCTS WORKS.

Smokeless Fuel Production.

On Tuesday of last week, the Minister of Mines (the Rt. Hon. W. C. Bridgeman), accompanied by Sir George Beilby (Director of the Mineral Research Bureau), visited the Midland Coal Products, Ltd., Testing Station situated at the Kirkby Colliery of the Butterley Company, Ltd. Dr. Wheeler, of Sheffield University, and Mr. James Swinburne, of London, were also present. The visitors were received by Captain H. F. Wright, Sir Ernest Jardine, Mr. Taylor, and Mr. H. Eustace Mitton (Directors of the Company), and the officials.

At the Testing Station, the process of converting half-inch top hard slack into a smokeless fuel, where a ready market is found for the same in gas producers in place of anthracite, and the yields of gas and other products were inspected with great interest. The Manager (Mr. Fisher) demonstrated by practical illustration the suitability of the fuel for domestic purposes by open hearth fires burning in the offices; the same being readily lighted, the fuel containing 1 p.ct. of volatile matter. The retort, which is the result of many years of testing with various types, is satisfactorily dealing with over a ton per hour throughput, and is very low in upkeep.

After inspecting the briquette and washery, the party proceeded to the Butterley Company's Codnor Park Works. Here there is a gas-producer plant working entirely on the retorted fuel. The capacity of the plant is 250 kw, and, on a working load of 230 amps., is running at a very low cost per unit generated, due to the low consumption and cheapness of the fuel compared with anthracite. Compared with gas coke, the power is much greater, and the cost per unit much lower.

Time did not permit the inspection of the new works at Colwick, where retorts are now being erected, and which are expected to be working by the end of the year.

Complaints and Economies in Wharfedale.—Following complaints in the Yeadon, Guiseley, and Menstone districts of West Yorkshire about the price and quality of the gas supplied by the Yeadon and Guiseley Gas Company, and a suggestion by Dr. Cheetham, the Medical Officer of Health for Guiseley and Wharfedale Rural Area, that the authorities affected should appoint a joint inspector "to keep a check on the quality of the gas," Mr. J. Lister Cooper, the Manager to the Gas Company, has told an interviewer that such an appointment would be welcomed. The Company, he said, are supplying gas between 20 and 30 B.Th.U. higher than is paid for. They have installed a new governor which ensures more regular pressure in the Menstone mains, and complaint of poor lighting is due to strictly local defects, which can be remedied as reported. Before the war the Company charged 2s. 6d. per 1000 c.ft.; and this had been increased gradually only to 3s. 6d. in 1920—a figure much lower than that of most surrounding authorities. In 1921 the price had to be advanced to 4s. 2d.; and the adoption of the thermal unit measurement made the price equivalent to slightly over 4s. 3d. per 1000 c.ft. For four or five years, said Mr. Cooper (who is Secretary of the Yorkshire Commercial Section of Gas Managers, of the West Riding area of the National Gas Council, and of the Yorkshire region of the Gas Industrial Council), the Company had been selling gas at less than the cost of production, and paying dividends out of reserve fund; but such a condition could not go on indefinitely. Hence the advance to an economic figure. Mr. Cooper expressed the view that the Company had given away fully £10,000 in this way during the past five years, and it is highly probable their will be a reduction next January.

TRADE NOTES.

Rotary Pumps.

From Messrs. Stothert and Pitt, Ltd., of Bath, we have received a copy of a very useful catalogue descriptive of the rotary pumps manufactured by them, and which are designed for dealing with a wide range of viscous and non-viscous fluids. The catalogue also includes general data defined by actual experiments for dealing with liquids of a viscous nature—such as fuel oil and tar. The pumps are constructed on the Feuerheerd principle, and their action is a distinct departure from that employed in other rotary types. It is claimed that the advantages are extreme simplicity and entire absence of valves, while the action is positive and the output against pressure steady. Quite a large number of the pumps are utilized on duties varying considerably in their character—including oil fuel transfer, forced lubrication and oil cooling, pressure feed to oil-fired boilers, water circulating, tar spraying, &c. Test graphs show a very high percentage efficiency, and this with liquids of high viscosity, such as fuel oil and tar. The technical information given in this catalogue is worthy of a place for reference purposes in the library of every engineer.

The Stretford Transfer.

The "Manchester Dispatch" says that the time is fast approaching when Stretford (Manchester) householders will cease to pay their gas bills to the Manchester authority and buy from the new Joint Board. Preparations are already being made for the transfer, which takes place on Sept. 29; and the Joint Board holds its first meeting on Tuesday to form a constitution and to appoint its Chairman. The undertaking is to be acquired at a cost of between £300,000 and £350,000, the price at which Manchester took it over, *plus* capital expenditure which the city authority has incurred during its possession. Our contemporary is informed that the constituent authorities have met with no difficulty in obtaining the necessary advances for the purchase. It is not proposed to make any alteration in the organization. The staff will remain unchanged.

Wellingborough Report.

The report of the Directors of the Wellingborough Gas Company states that the profit for the half year, after providing for interest and income-tax, and carrying £150 to the insurance fund, amounted to £3746. The balance brought forward from last account, after carrying £1000 to the reserve fund, was £88. This, added to the profit for the half year, gives an available balance of £3564. The Directors recommended that out of this sum dividends of 7½ p.ct. on the "original" and 5 p.ct. on the "additional" shares, less income-tax, be declared for the half year. The payment of dividends and tax would absorb the sum of £3235, leaving £328 to be carried forward. The draft order under section 10 of the Gas Regulation Act had been approved by both Houses of Parliament, and as soon as the Order had been made by the Board of Trade, the shareholders would be asked to pass resolutions authorizing an increase in the capital of the Company. The price of gas had been reduced by three-fifths of a penny per therm from July 1. The sale of gas had increased by nearly 12 p.ct. compared with the corresponding quarters of 1921. The mains were being enlarged and extended to cope with the increased demand, and a boosting plant was being installed to maintain greater pressure than could be given by the weight of the holders alone.

Provan Chemical Works.—The official inspection of the additional buildings and plant at the Chemical Works of the Glasgow Gas Department at Provan takes place towards the end of September. The new work includes ferro-concrete tanks for the storage of tar and liquor, coke and ash bunkers, &c.

Reductions in Scotland.—The price of gas at Forfar has been reduced to 4s. 1d. per 1000 c.ft.—a reduction of 11d. For power engines, the charge is 3s. 10d. At Fraserburgh, the saving on coal for the current year is estimated at £3000; and the price of gas has been reduced from 7s. 6d. to 6s. 8d. The Stirling Gas Company are reducing their rate by 10d.; the present price being 9s. per 1000 c.ft.

Weymouth Consumers' Gas Company.—The Directors, in presenting the accounts for the half year ended June 30, say that the demand for gas still continues to increase, the quantity sold during the six months being 416,678·12 therms or 90,582,200 c.ft., an advance of 2,534,000 c.ft. (equal to 2 87 p.ct.) upon that of the first half of 1921. An increase of £956 consequently appears in the receipts from gas. There is a slight decrease in the returns from residual products, due to a fall in the price of tar, but this is more than balanced by a considerable decrease in the cost of coal and its equivalents (coke and oil for carburetted water gas). The Directors consider the result of the half year's working very satisfactory. On the net revenue account, after debiting the charge for interest on the debenture stock, the balance is £7649, from which they recommend the payment of a dividend on the ordinary stock for the half year at the maximum rate of 5 p.ct. per annum, less income-tax.

Leatherhead Gas and Lighting Company.—The Directors open their report for the year ended June 30 by congratulating the shareholders upon the considerable improvement which is taking place in gas affairs. The falling prices of coal and other materials and wages during the past year have enabled the Company to present a favourable report, and to recommend a further dividend of 4 p.ct., making, with the interim dividend of 2½ p.ct. paid in February, 6½ p.ct. for the year, less tax. The amount to be carried forward to the next accounts will be £567. The Board of Trade have fixed the standard price of gas under the Regulation Act at 1s. 4⅝d. per therm of 500 B.Th.U. gas. The Company have not, however, charged as high a rate as allowed by this Order. At first the price was 1s. 3⅝d. per therm. This was reduced at March to 1s. 3d. per therm, and again at June 30 to 1s. 2⅜d. per therm; and it is probable that further reductions will take place in the near future.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 28.

The pitch outlook remains very strong, and there are buyers for export at 82s. 6d. to 85s. per ton net cash f.o.b. makers' works; but sellers are scarce. Creosote is also in demand; and the value is about 6⅞d. to 7d. net per gallon in bulk. Benzole, toluole, and solvent naphtha, especially the first named, are in improved demand at slightly better prices.

Tar Products in the Provinces.

Aug. 28.

The market for tar products still remains steady. In pitch there is a good demand both for prompt and forward delivery, and business has been done during the past week at increased prices. Possibly these have been realized on account of the better demand for coal, due to America again coming into the market. Creosote is steady, and sales are reported at better prices. Other products remain the same.

The average values for gas-works products during last week were: Gas-works coal tar, 46s. 6d. to 51s. 6d. Pitch, East Coast, 80s. to 82s. 6d. f.o.b. West Coast—Manchester, 75s. to 76s.; Liverpool, 76s. to 77s.; Clyde, 77s. to 78s. Benzole 90 p.ct. North, 2s. to 2s. 1d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 2s. to 2s. 1d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9¼d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6d. to 6¼d.; salty, 5¼d. to 5⅜d. Scotland, 4⅜d. to 5d. Heavy oils, in bulk, North, 6¼d. to 6½d. Carbolic acid, 60 p.ct., 2s. to 2s. 1d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

Although there has been no great change in prices since the last report, the market for tar products is fairly firm, the partial settlement of the coal strike in America not having as yet made much difference. Hence it is thought that coal in the United States will be scarce all through the winter, and it is possible that America will consequently still need to buy some of our tar products for a little time ahead. Pitch continues very firm, with a fair inquiry; many makers still holding out for higher prices. South Wales is not doing much at present, and Continental buyers are unwilling, or possibly unable on account of the exchange position to pay the present level. The demand for creosote has not yet advanced the price to any extent, and this remains firm at 6½d. per gallon. Solvent naphtha is improving on the better conditions in the rubber manufacturing trade. Quotations range from 2s. 2d. to 2s. 4d. per gallon, although lower prices are occasionally heard of. Only a little crude carbolic acid is being produced, and, curiously enough, foreign buyers are in the market at about 2s. per gallon. Home buyers are, however, not prepared to pay more than 1s. 10d. per gallon; this being the highest they can offer to pay if they can only obtain 6d. per lb. for crystal carbolic, which is the current range. Naphthalenes remain a very quiet market; crudes being worth £4 10s. per ton, and refined £17 per ton. Benzole is steady without much change, at 2s. per gallon; but there is no great demand for pure benzole at 2s. 4d. to 2s. 6d. per gallon. Business in intermediate products continues flat, although the export trade seems to be improving. Prices remain without change.

Sulphate of Ammonia.

Despite the certainty that quotations for sulphate of ammonia will advance as the season progresses, home consumers are taking only very moderate quantities. On the other hand, the export trade is increasing; and with America practically out of the market, owing to her own shortage of this material, it is quite likely that export prices may be increased. The current value for export is £17 10s. to £18 per ton, according to port. Traders in the United States believe, according to information from that side, that the American market will be a very good one for exporters of British sulphate of ammonia, producing a corresponding further shortage in supplies for the trade here at home. If this view is correct, there is nothing to be gained by merchants and dealers delaying the placing of their orders.

Walney Island Gas and Water.—The Barrow Town Council have applied to the Ministry of Health for sanction to borrow £11,000 for the purpose of laying a new water-main, and £3000 for a gas-main to serve Walney Island, where there are now a thousand houses, including Vickerstown. The only water supply was connected many years ago; and there is no gas laid on. An inquiry was held last Wednesday by Mr. A. W. Brightmore, an Inspector for the Ministry.

Hampton Court Gas Company.—A dividend for the half year ended June 30 at the rate of 6½ p.ct. per annum, less income-tax, was declared at the meeting of the shareholders of the Company on Thursday last. The Directors in their report announced that the price of gas was reduced 1d. per therm from the Lady Day quarter; and, owing to further decreases in the cost of raw material, &c., another reduction was possible. Notice had been issued of a further reduction of 2d., to date from the commencement of the Michaelmas quarter; thus making the price of gas 10d. per therm. The Engineer and Manager, Mr. William E. Price, who had been in the service of the Company 46 years, during which time he had shown himself a devoted and highly efficient officer, was appointed Managing-Director of the Company, with a seat on the Board.

Irish Gas Workers.—The Tipperary gas workers' dispute has been adjusted. At the Newry Gas-Works a dispute has arisen on a proposed reduction from double time to time-and-a-half for stokers employed on Sunday overtime work. The matter is to be considered by the municipal authorities.

Dublin Gas Company's Dividend.—The Directors of the Alliance and Dublin Consumers' Gas Company announce a dividend at the rate of 5 p.ct. per annum (5s. per £10 of stock), placing £4849 to reserve, and carrying forward £3912. Last year's dividend at the corresponding period was 3 $\frac{7}{16}$ p.ct.; and the amount carried forward was £5591.

Maximum Dividend at Shrewsbury.—The report of the Directors of the Shrewsbury Gas Light Company shows that the net profit for the year to June 30 last amounted to £12,082. A dividend of 4¼ p.ct., less tax, for the year (being the maximum authorized under the sliding-scale) is recommended; leaving £8049 in the profit and loss account, part of which will be required to replace withdrawals from reserve fund account.

The Thornton Undertaking.—The Gas Manager recently reported to the District Council that for July 1,871,000 c.ft. of gas had been produced, and that 155 tons 12 cwt. of coal had been carbonized, equal to 11,693 c.ft. of gas per ton of coal carbonized. The gross profit for the year was £2218, and the net profit £41, compared with £2190 and £248 respectively for the previous year. The deficiency on these works has thus been reduced to £4404.

Dalbeattie.—The 64th annual general meeting of the Gas Light Company was held recently, and the balance-sheet showed a loss on the year's working of £78. The price of gas is 9s. 7d. per 1000 c.ft.; but the Directors will keep before them the question of a reduction as soon as circumstances permit. Water-gas plant is being installed, and should aid in effecting economy. Expert advice is to be called in to consider the question of how to deal with the large amount of leakage that takes place throughout the town.

A Mantle Complaint in Bradford.—A local hardware dealer has sent to the Bradford Chamber of Trade a protest against the Corporation Gas Department, at its showrooms in Darley Street, selling foreign mantles (he declares they are German) at what he contends to be unfair cut prices. The Executive of the Chamber, having in mind previous complaints by plumbers and others as to the trading of the Gas Department in competition with private businesses, considered the matter; but, in view of the known fact that at least 80 local plumbers and hardware traders regularly buy their mantles from the Corporation Gas Department, the Chamber failed to see how it could take any action against an institution which is so heartily supported by the traders who complain about it.

Cheaper Gas in Leeds.—The Leeds Gas Committee last week decided to reduce the price of gas by 6d. per 1000 c.ft., the reduction to take effect from Sept. 30. Last year, owing to the coal strike and a heavy falling-off in the sale of residuals, there was a loss of £78,000. In the current financial year, successive improvements in the position of the undertaking have enabled first a reduction from 5s. 3d. to 5s. per 1000 c.ft., and now the welcome fall to 4s. 6d. is to be made. Receipts show an advance over the corresponding period of last year; and in addition there is a reasonable prospect of production costs being lowered when the new vertical retorts at Meadow Lane come into operation. Alderman Penrose Green, the Chairman of the Gas Committee, considers the reduction is fully warranted in the better financial circumstances. In addition to lightening the domestic consumption bill, he hopes the lower price will encourage the larger users, and react beneficially on the general industrial position.

The Selby Urban District Council have decided to reduce the price of gas by 10d. per 1000 c.ft. for the quarter ended June 30.

The Leek (Staffordshire) Urban District Council have decided to borrow £2600, at £4 15s. p.ct., for gas-main extensions, from the Leek and Moorlands Building Society.

A dividend of 5 p.ct. has been declared on the paid-up capital of the Turriff Gas Company, and £100 placed to reserve account. The rate is now 9s. per 1000 c.ft., since a reduction of 6d.

At the first meeting of the new Gas Commission for Buckhaven, Methil, and Leven, Bailie Nicol, of Buckhaven, was elected Chairman, Mr. R. Leslie Secretary, and Mr. W. Nisbet Treasurer.

The Kidderminster Gas Company have announced that the price of gas will be reduced as from the June readings, and further reduced from the September readings, when it will be 5s. 6d. per 1000 c.ft.

At the annual Workshops Competition held recently under the auspices of the Eccleshill (Bradford) Cricket Club, the silver cup, with medals for each player, was won by the team of the Bradford Corporation Gas Department.

The Holytown Gas-Works have now become the property of the County Council of Lanarkshire. The purchase price was £10,000, which is regarded as a moderate sum. Developments are contemplated by the County Council.

A profit of £419 is reported by the Kirkham Gas Company on the last half year's working. With £1579 brought forward, this makes a balance of £1919. After the necessary deductions, there is a disposable balance of £1676; and a dividend of 6 p.ct. is recommended.

Disagreement between the Bingley (Yorkshire) Gas Department and the stokers at the works arose on Aug. 21, and the men suspended work for a few hours. The trouble was soon adjusted, and they were back at work by noon. There was no interruption in the supply of gas to the town.

Considerable inconvenience was occasioned on Tuesday last week at Brighton by the failure of the Corporation electricity supply in the middle of the afternoon. The stoppage resulted from trouble with two generators; and the Engineer stated that the undertaking was experiencing difficult times, and that labour upsets and the coal situation had interfered with the programme of repairs.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week showed no improvement. International relations, coupled with tightness in the Money Market, threw a dark shadow over pretty well everything. Gilt edged were flat generally, and Home Government issues were very dull. The big four marked on Friday: Consols 57½-58⅛, War Loan 99¾ 100, Funding 87½-88⅜, Victory 88-89. Home Rails were irregular, dull for the most part. The Foreign Market was weak.

Business in the Gas Market was fairly active for August; and the general tone was excellent. The London Companies were steady, Gas Light ordinary rising 1. In the Suburban and Provincial group, Aldershot preference rose 2, Brighton and Hove original 2⅜, ditto ordinary 4¼, Hornsey 1⅜, Lea Bridge 2, North Middlesex 7 p.ct. ⅜, Portsea Island "B" 3¼, ditto "C" 3, and Wandsworth-Wimbledon 3. The feature in Continentals was a smart recovery of 10 in Imperial. Primitiva shares were steady; but the 4 p.ct. debenture fell 2½.

The following transactions in gas during the week were recorded: On Monday, Aldershot preference 72½, British 30⅞, Gas Light ordinary 95, 95½, 95½, 95⅝, 95⅝, 96, ditto preference 81, ditto debenture 62, 62½, Imperial Continental 140, 143⅜, 144, Primitiva 14s. 3d., ditto preference 39s. 3d., 40s. 4½d., South Metropolitan 95, 95⅜, 95⅜, South Suburban debenture 96, Tottenham "B" 99½, Croydon 5 p.ct. maximum "D" 80, Grays and Tilbury 7 p.ct. ordinary "B" 6 13/16. On Tuesday, British 31½, 31⅝, European 9⅝, 10, Gas Light ordinary 95⅝, 95⅞, 96, ditto maximum, 62½, 63½, ditto preference 80, 80⅜, Imperial Continental 144, 145, 148, Lea Bridge 100, Primitiva preference 39s. 6d., 40s., 40s. 4½d., South Metropolitan 95, Wandsworth-Wimbledon 99, Swansea 6½ p.ct. debenture 105½, North Middlesex 5 p.ct. preference 79½, Hartlepool 5 p.ct. 73. On Wednesday, Alliance and Dublin debenture 63, Brentford "A" 97½, Gas Light ordinary 95½, 95⅝, 95¾, 95⅞, 96¼, ditto preference 79⅜, 80, 81, ditto debenture 62½, 63⅜, Imperial Continental 149, 150, 151, 151½, 152½, Primitiva prefe ence 40s., 40s. 3d., 40s. 4½d., South Metropolitan 3 p.ct. debenture 62, South Suburban 97½, ditto 5 p.ct. debenture 97⅜, 98, North Middlesex 5 p.ct. preference 79, Southgate and District 5 p.ct. preference 89, Monte Video 5 p.ct. preference 77. On Thursday, Alliance and Dublin debenture 62½, British 4 p.ct. debenture 78½, 78⅜, Gas Light ordinary 95½, 95⅝, 95⅞, 95⅞, 96, 96⅛, 96¼, 96⅜, ditto preference 81, ditto debenture 63. Hornsey 131½, 152½, Imperial Continental 151, 152, ditto debenture 72½, Primitiva preference 40s. 6d., ditto debenture 70, South Metropolitan 95½, 95⅞, ditto 6½ p.ct. debenture 106⅛, 107½, South Suburban 100, ditto 5 p.ct. debenture 97, ditto 7 p.ct. debenture 101, Brentford 6 p.ct. mortgage 99, North Middlesex 5 p.ct. preference 85, Great Yarmouth 7½ p.ct. maximum 29, 29½, British (Norwich) 7 p.ct. debenture 54, Woking District 5 p.ct. "C" 70. On Friday, Alliance and Dublin debenture 64, 64¼, Commercial 4 p.ct. 95½, European 9⅞, 9 15/16, 10, 10⅛, Gas Light ordinary 95½, 95⅝, 95¾, 96½, 96⅝, ditto maximum 62½, ditto preference 80¼, Imperial Continental 147, Monte Video 64½, Primitiva preference 39s. 6d., 40s., 40s. 3d., 40s. 6d., South Metropolitan 96, ditto 6½ p.ct. debenture 107½, South Suburban debenture 98, 98½, Tottenham "B" 99⅜, 99⅝, 100⅛, ditto 6 p.ct. debenture 99, Harrow and Stanmore 5 p.ct. 85½, 86.

In the Money Market, things were quite comfortable in the earlier portion of the week, supplies being adequate to meet every requirement; but tightness manifested itself on Wednesday, and things were harder still on Thursday. This was somewhat relieved, however, by the close of the week. Discount rates marched in step. Silver was fractionally higher at 35½d. The Bank of England rate was 3 p.ct., as fixed on the 13th ult.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	70—75*	...
1,551,868	,,	Apl. 12	2½	3 5/16%	Alliance & Dublin Ord.	59—64	60—65	...
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	62½—64½
280,000	5	May 18	7½	4/-	Bombay, Ltd.	5⅛—6⅛	4⅛—5	...
100,000	5	Aug. 10	16	7½%	Bournemouth Gas and Water: 5 p.c.	..	11—12	...
383,110	10	,,	7	7%	Bournemouth Gas and Water: B 7 p.c.	15—15½	10½—11⅛	...
115,000	10	,,	6	6%	Bournemouth Gas and Water: Pref. 6 p.c.	13⅛—14	8—9	...
162,065	—	June 29	—	4%	Bournemouth Gas and Water: 4 p.c. Deb.	..	63—68	...
992,045	Stk.	July 27	14	6t/-	Brentford A Consolid.	261—266	93—98	97⅛
734,920	,,	,,	11	6t/3	Do. B New	204—209	93—98	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Aug 24	11	11½%	Brighton & Hove Orig.	208—213	165—170*	...
244,200	,,	,,	8	8⅛%	Do. A Ord. Stk.	154—159	120—125*	...
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Mch. 15	12½	10%	British	44—45	30—32	30⅞—31⅜
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	76—80	78⅛—78½
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1⅛—2⅛	6⅛—7⅛	...
100,000	10	Apl. 27	—	4½%	Do. 4½ p.c. Pref.	4—6	6—6½	...
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	92—97	95¼
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	92—97	...
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	30—40	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	..	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	..	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17⅛—18	9⅜—10⅛	9⅝—10⅛
16,298,975	Stk.	July 27	4/17/4	52/-	Gas Light: 4 p.c. Ord	98—102	95—97	95—96⅛
2,600,000	,,	,,	3½	35/-	Gas Light: 3½ p.c. max.	76—79	61—64	62½—63½
4,062,235	,,	,,	4	4%	Gas Light: 4 p.c. Con. Pref.	96—99	78—81	79⅜—81
4,674,850	,,	June 15	3	3%	Gas Light: 3 p.c. Con. Deb.	72½—74½	62—65	62½—63½
130,000	,,	Dec. 11	10	10%	Coke 10 p.c. Bonds	..	..	...
82,500	,,	Sept. 14	5	3½%	Hastings & St. L. 5 p.c.	..	78—81	...
258,740	,,	Mch. 15	3½	2⅜%	Do. 3½ p.c.	87—89	60—63	...
70,000	10	May 18	11	5%	Hongkong & China, Ltd.	16⅛—16½	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c.	..	127—132*	131½—132½
131,000	,,	Aug. 10	7⅛	7½%	Ilford A and C	151—154	..	...
65,780	,,	,,	6⅛	5⅛%	Do. B.	115—118	..	...
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	..	...
1,976,000	,,	May 18	9	10%	Imperial Continental	150—160	150—155	140—152½
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	72—77	72½
235,242	,,	July 27	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	100
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. A.	211—213	..	...
					Liverpool 5 p.c. Ord. B.	146—148	..	...
306 083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean Met. of Melbourne: 4½ p.c. Deb.	4⅛—4⅜	3⅛—3⅜	...
250,000	100	Apl. 3	4½	4½%		99—101	97—98	...
541,920	Stk.	June 1	4	4%	Monte Video, Ltd.	11⅛—12	63—68	64½
1,875,892	,,	July 27	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	81½—82½	...
529,705	,,	June 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	65—70	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	12⅛—13	...
55,940	10	Aug. 24	7/14/0	7/8 5/8	,, ,, 7 p.c.	14—15	10⅛—11⅛*	...
300,000	Stk.	May 18	8	8%	Oriental, Ltd.	117—122	92—97	...
60,000	5	—	10	—	Ottoman, Ltd.	7⅛—7½	2—3	...
188,120	Stk.	June 29	—	6/3/9%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B	128—131	100—105*	...
100,000	50	,,	12	60/-	Do. C	118—121	85—90*	...
249.980	5	—	8	—	Primitiva Ord.	5⅛—6	⅞—1	14/3
499.960	5	—	5	—	Do. 5 p.c. Pref.	4⅝—5	1⅛—2⅛	39/3—40/6
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	70—75	70
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	...
150,000	10	Mch. 30	6	6/-	San Paulo: 6 p.c. Pref.	10⅛—11	5⅛—6⅛	...
125,000	50	July 3	5	5%	San Paulo: 5 p.c. Deb.	47—49	35—38	...
135,000	Stk.	Mch. 15	10	5%	Sheffield A	223—224	96—98	...
209,984	,,	,,	10	5%	Do. B	222—224	96—98	...
525,500	,,	,,	10	5%	Do. C	220—222	96—98	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	June 29	9	7½%	South African	10⅛—11⅛	7—9	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	94—97	93—96
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	94—96	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—64	62
224,820	,,	Aug. 24	8½	8½%	South Shields Con. Stk.	157—159	106—108*	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100*	97½—100
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	96—98⅛
647,740	,,	May 18	5	5%	Southampton Ord.	99—102	75—80	...
121,275	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	63—68	...
120,000	,,	July 27	—	7½%	Tottenham District: A 5 p.c.	135—138	110—115	...
782,275	,,	,,	6	6%	Tottenham District: B 3½ p.c.	115—117	97—102	99½—100⅛
181,255	,,	June 15	4	4%	Tottenham District: 4 p.c. Deb.	87—89	75—80	...
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	...
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	...
236,476	Stk.	Aug. 24	5	2½%	Tynemouth 5 p.c. max.	108½—109	73—75*	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 27	8½	72/6	Wandsworth A 5 p.c.	151—156	111—115	...
855,636	,,	,,	6½	57/6	Do. B 3½ p.c.	129—134	95—100	...
1.8,075	,,	,,	—	50/9	Do. C.	..	85—90	...
140,865	,,	,,	—	50/9	New Ordinary	..	85—90	...
352,000	,,	,,	6½	53/9	Wimbledon 5 p.c.	117—122	95—100	99
98,000	,,	,,	6½	58/9	Epsom 5 p.c.	121—126	95—100	...
88,4:6	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

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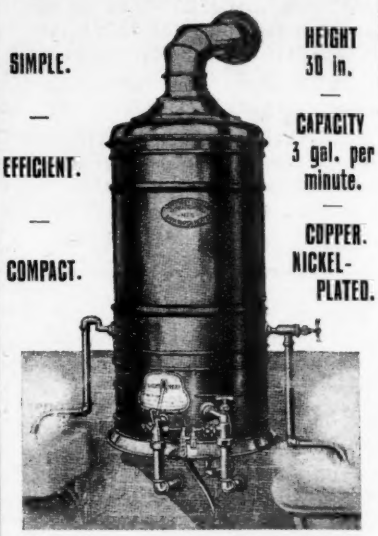

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Two	30	0 ×	8	3 ×	160	6028/9.
One	30	0 ×	8	3 ×	120	6025.
Four	30	0 ×	8	3 ×	100	5678.
One	30	0 ×	7	6 ×	180	5967.
Three	28	0 ×	7	6 ×	160	5792/4.

All the above Boilers are built from "Siemens Martin" Acid Steel.
REPAIRS TO ALL TYPES OF BOILERS BY FIRST-CLASS MEN.
John Thompson (Wolverhampton), **Ld.**
ETTINGSHALL, WOLVERHAMPTON, Eng.

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